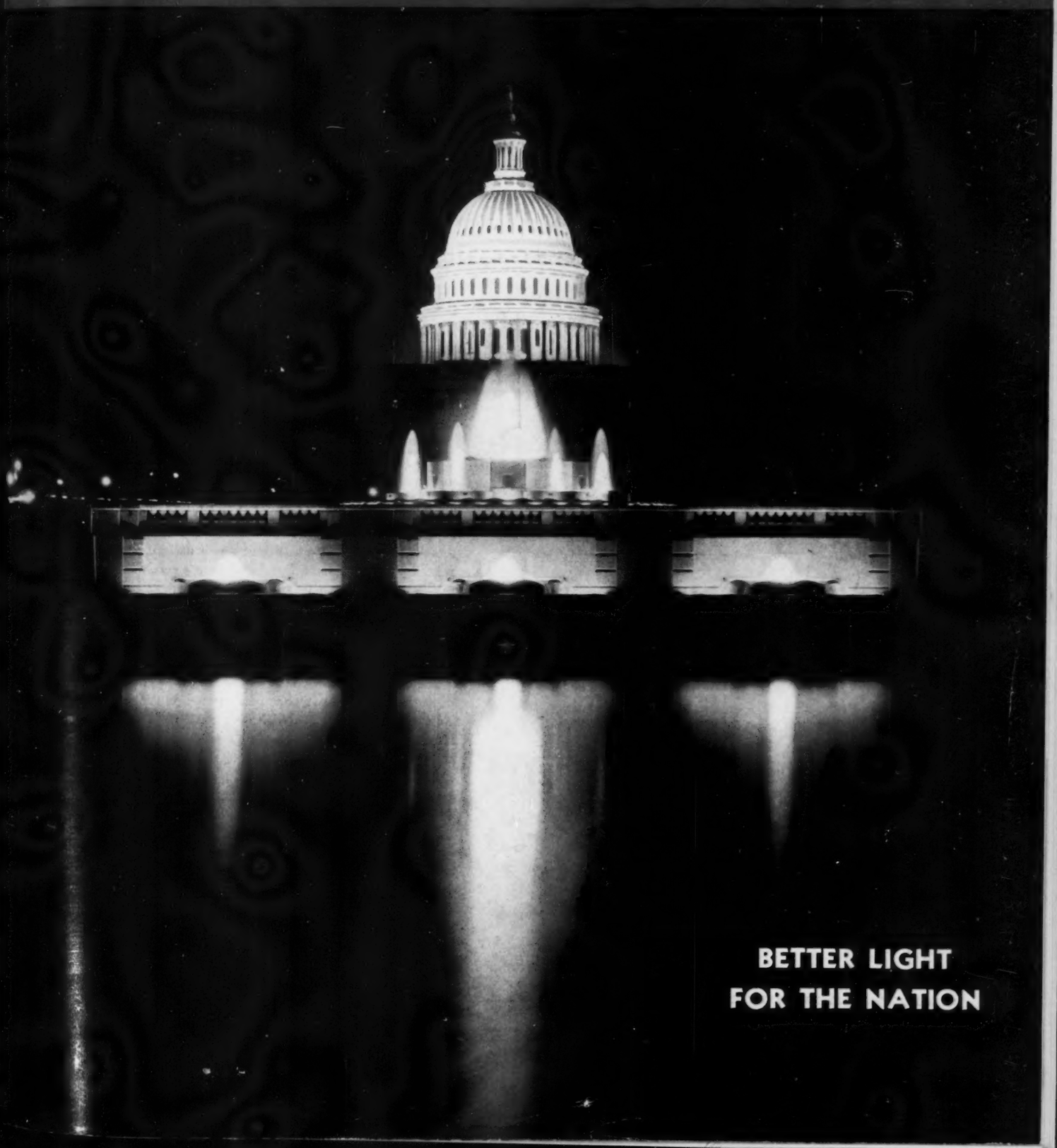
AUGUST 1, 1936

ELECTRICAL WORLD

AUG 6 1936

McGRAW-HILL PUBLISHING COMPANY, INC., NEW YORK CITY. 25 CENTS PER COPY



BETTER LIGHT
FOR THE NATION

Locate AND *Stop*

YOUR WASTED POWER . . . WITH

WESTON Junior Portable Test Instruments

The amount of power wasted through gear misalignment at *one* machine may not be serious today . . . although, tomorrow, it can be wasting as much as 5% of the transmitted power . . . and a few days hence a costly breakdown follows. But add to this loss from one gear box similar power losses from other machines . . . and from tight or loose belts, shaft misalignments, over-loaded motors, worn impellers, bearing friction, etc. *The accumulation of these losses becomes a sizable sum.*

All of these losses can be eliminated . . . full utilization of the transmitted power at every point on the production line can be assured . . . with inexpensive WESTON maintenance tools. A quick, periodic check of all electrical units with WESTON Junior portable test instruments instantly signals any potential trouble, and permits correction before serious loss occurs. And in most cases, the detection of one leak saves more than the cost of these instruments.

WESTON Junior Instruments are small, compact, rugged and inexpensively priced, yet they have the full dependability which the name WESTON implies. They include DC instruments, AC instruments and single phase Wattmeters. Ask for complete literature . . . WESTON Electrical Instrument Corporation, 578 Frelinghuysen Ave., Newark, N. J.

WESTON

Instruments

ELECTRICAL WORLD

FOUNDED IN 1874 ✦ ✦ READ BY ELECTRICAL MEN FOR SIXTY YEARS

HOWARD EHRLICH, Vice-President

L. W. W. MORROW
Editor

W. K. BEARD, Jr.
Manager

A. E. KNOWLTON, Associate Editor
EARL WHITEHORNE, Associate Editor
H. G. DOOLEY, Associate Editor
G. F. WITTIG, Statistical Editor
FRANK R. INNES, Western Editor
H. S. KNOWLTON, New England Editor
PAUL WOOTON, Washington Correspondent
L. H. CHURCH, Cleveland Editor
C. W. LEIHY, Pacific Coast Editor

Coming Features

Rural Construction Practice

Current rural construction practice will be summarized in a special ELECTRICAL WORLD insert on August 15. Typical pole tops, transformer poles, services, guying, spans, protection, metering, and substations will be illustrated and the subject of rural service in general discussed in live, authoritative fashion.

World Power Conference

A true picture of American power practice will be presented in special articles on steam plants, power statistics and other related subjects of interest to the visiting engineers. There will be an eight-page map of the national power system too. Watch for the World Power Conference insert August 29.

New York Merchandising Plan

Based on a partnership between utility, manufacturer, distributor and retail appliance dealer, the New York Edison Company's new merchandising plan places specific obligations and duties on each and all partners with respect to each other and equally with respect to the customer. This article describes the plan.

Oil Refineries Use More Power

Refinery Engineer Richard Henry tells how recent developments in equipment for safety and economy are influencing the decision on utilization of power in refineries. He tells what equipment is being used and why.

Cover Picture

"Better Light for the Nation," the striking night photograph of the Capitol at Washington on the cover of this issue, was furnished through the courtesy of Westinghouse Lamp Company.

CONTENTS

AUGUST 1, 1936

Unattended Substation Has Period Styling 21

Best in Baseball Lighting at Low Cost 25

How to Get Going on the Home-Lighting Job 26

Bethlehem's 72-Inch Sheet Strip Mill 28

Let's Light the Nation's Schools 32

Bonneville Power Cost Study 35

Load Building Value of Better-Light Sales 35

New May Records for Utilities 37

Carter Field on Washington Events 40

¡Better Light-Better Sight Feature . . 51

Foundation Laid for Decade of Lighting Sales 52

A Million Tags Issued in 18 Months. 53

Light Averts More Than Two in Five Night Deaths 54

Lighting Store and Factory 56

Profitable Load, Cost Reasonable, Pace Satisfactory 60

Load Building by Light for Seeing . . . 63

Light for Seeing Will Triple Sales . . 66

Editorials . . . . . 19 and 38

Men of the Industry 112

New Equipment 114

Recent Rate Changes 118

Municipal Items 118

Sales Opportunities 120

NEWS OF THE WEEK 42

ELECTRICAL WORLD—Published every Saturday. Price 25 cents a copy. Subscription rates: United States, Canada, Mexico, Central and South American countries, $4 a year; all other countries, $6 or 24 shillings a year. Entered as second-class matter, January 20, 1907, at Post Office at New York, N. Y., under the Act of March 3, 1879. Printed in U.S.A.

Branch Offices: 520 North Michigan Ave., Chicago; 883 Mission St., San Francisco; Aldwych House, Aldwych, London, W.C. 2; Washington; Philadelphia; Cleveland; Detroit; St. Louis; Boston; Atlanta, Ga.

VOLUME 106 . . . NUMBER 31

Contents Copyrighted, 1936, by McGraw-Hill Publishing Company, Inc.

McGRAW-HILL PUBLISHING COMPANY, INC.

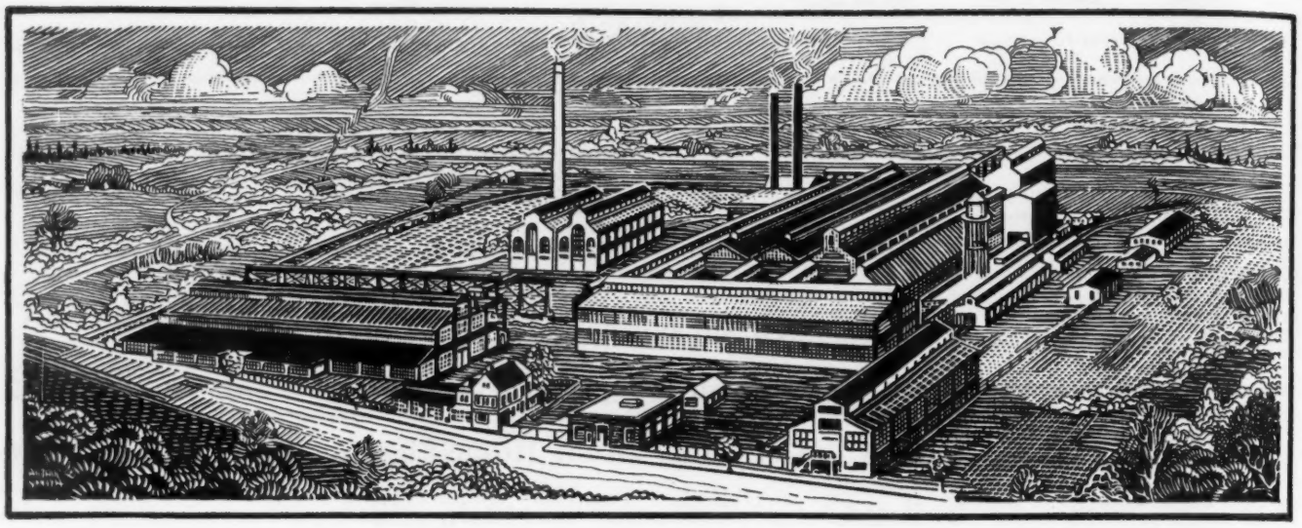
330 West 42d Street, New York, N. Y.

JAMES H. McGRAW, JR., Chairman
MALCOLM MUIR, President
JAMES H. McGRAW, Honorary Chairman
HOWARD EHRLICH, Vice-President
B. R. PUTNAM, Treasurer
D. C. McGRAW, Secretary

Cable Address: MCGRAWHILL, New York. Member A.B.P. Member A.B.C.

OKONITE-CALLENDER RESEARCH

has never stopped!



EVEN during the long economic depression, large research expenditures were made by Okonite-Callender to produce new cables for the already perceptible new trends. The entire field was covered, from distribution to super-tension voltages, and many new features and improvements were developed.

But from the first cable manufactured, this same intensive research has been back of every Okonite-Callender cable. The practical result has been the satisfactory operating performance of the many million feet of Okonite-Callender cables. These are of every type, in every kind of service, in every part of the country. That is the operating record—and that counts most!

Okonite-Callender is a *specialist* in the manufacture of impregnated paper-cables. The plant, at Paterson, New Jersey, is devoted *exclusively* to the production of these cables. This spacious plant, with its extensive factory buildings and completely modern laboratories, was built for this very specialization.

Okonite-Callender cables are made in all types and for every voltage. The chief products are:

Solid, non-shielded, belted paper-insulated cable.
Solid, shielded paper insulated cable.
Oil-filled, single-conductor paper insulated cable.
Oil-filled, multi-conductor paper insulated cable.
Oilostatic Transmission Systems.
Splicing materials (all kinds for paper-insulated cables).

Okonite-Callender is licensed to manufacture under patents covering Compack Strand Conductor and other special features such as: Super-dense Paper—Intercalated Paper—Carbon Dioxide Gas Treatment.

Prices and complete information will be furnished on all products. We offer an active, practical engineering service for assistance in the selection of the proper cable designs for different conditions of installation.

THE OKONITE COMPANY
Founded 1878
and
HAZARD INSULATED WIRE WORKS DIVISION
THE OKONITE-CALLENDER CABLE COMPANY, INC.
EXECUTIVE OFFICE: PASSAIC, N. J.

New York · Boston · Chicago · Detroit
Philadelphia · Pittsburgh · Washington · San Francisco
Los Angeles · Seattle · Dallas · Atlanta
Factories: Passaic, N. J. · Wilkes-Barre, Pa. · Paterson, N. J.

OKONITE QUALITY CANNOT BE WRITTEN INTO A SPECIFICATION

ELECTRICAL WORLD

MANAGEMENT • ENGINEERING • OPERATION • UTILIZATION

PUBLISHED EVERY SATURDAY

AUGUST 1, 1936

•

Stop—Look—Listen

What lies back of the fact that energy output exceeds all-time magnitudes nearly every week? The answer can be had by a tour around this country. In all sections business is on the upgrade. It is stimulating to find loads at a peak everywhere; to find a revival in building construction; to see industrial plants busy at production and in modernizing their factories, and to find a universal receptiveness to everything electrical.

It is like a breath of fresh air to get out of financial headquarters and away from centers of legal and political controversy into the field where tangible business is being done. There is a larger and larger volume of business for the electrical industry to sell and to serve.

These business realities make one wonder if management in the electrical industry accepts the solidity of this business upturn, is aware of its opportunity to capitalize upon conditions or of its obligation to assume a position of leadership in meeting the new conditions. The scene has changed in electrical manufacturing and in the light and power business, and so have the jobs to be done. There is every reason to go into action aggressively and with an optimistic attitude. Business can be built on solid foundations.

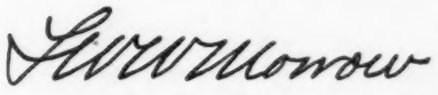
Take one example of a dealer speaking of his local territory: "All this electrical business from home and industry is coming because of economic improvement and federal propaganda for things electrical. The manufacturers and utilities aren't responsible; in fact, they are inert and asleep. Why don't they take leadership and awaken?"

Another example on another angle. A utility executive says: "We have got to reorganize this business so as to decentralize authority and make it intimate and personal. Managers must know customers and public on a friendly personal basis and win their confidence. The day is past when we could hire a lawyer or a public relations man to do our jobs."

Still another statement comes from the chief engineer of a utility: "We used to build ahead of the business. Now we lag behind. If load keeps up we won't be able to serve all customers this fall. We just can't sell our executives the idea of anticipating maintenance and building needs."

Of course it is unsafe to generalize, but these statements are encouraging. They indicate a realization of new conditions and are preliminary to constructive action. There is a natural lag in the knowledge of field conditions in the minds of management. But history proves that management in the electrical industry rises to its opportunities. It will do so again.

Despite uncertainties in the political and financial background, we urge that management stop, look, and listen to the realities that exist in the field and then act. There is a glow on the business horizon that points to the coming sunshine.



Editor

LIGHT
Is a Versatile Tool

Yellow sodium outshines accident records at traffic congestion points. This one is near Troy, N. Y.

Greenish-blue mercury combined with white incandescents for an effective blend to aid Philco radio workers to produce under 80 ft.-candles; alternate units at 9-ft. mounting height on 8-ft. centers.

Utility (Mississippi Power & Light) at McComb goes cove with 35 ft.-candles in the display room. Over the office end is 50 ft.-candles from a recessed concentrating louver.

Floodlighting of the nation's 175,000 service stations would add 100,000 kw. and $50,000,000 in equipment business. The station shown is in East Orange, N. J. It has nine 400-watt mercury lamps in open floods and five 500-watt tungsten floods inclosed. Mounted on 25-ft. poles, they give 4 ft.-candles. High level illumination is good business for the gasoline emporiums.

Unattended Substation Has Period Styling

Building was so designed as to screen from view the outside transformers by extending a wing of the building

Almar Substation of Cleveland Electric Illuminating Company Designed for High-Class Residential Service—Architectural and Design Features Shown

ALMAR substation, recently put into service in Shaker Heights, an exclusive suburb of Cleveland, is of the unattended type provided with automatic reclosing equipment for all outgoing feeders. It supplies service for a high-class residential district with a few scattered, commercially zoned sections.

The building is of the Georgian Colonial style, of red brick with white trim and green blinds. A hip roof is covered with weathering green slate to harmonize with neighboring residences. At the front and to one side a wing has been added to screen the transformers and bus structure from the street. The initial building as now constructed will house slightly more than one-half of the equipment for the ultimate planned capacity of 20,000 kw. All equipment is located on one floor, the only basement excavation being the cable tunnel for the outgoing feeders, all of which leave in underground ducts.

The present supply to the station is from two 37-kv. underground cables which also supply other substations. Normal operation is for each cable to feed a separate transformer, but switching arrangements are provided so that both transformers can be supplied from one cable. The ultimate plan calls for four cables and four transformers. Arrangements have also been made for a future 37-kv. transfer bus, when additional incoming cables and transformers are installed, which will allow increased flexibility and for emergency operation.

Protection on low side

Step-down transformers are 5,000-kva. units, three-phase, 36,000 to 4,600 volts, with provision for the addition of air-blast equipment to increase the rating to 6,667 kva. each. Low-voltage windings are connected delta; high-voltage windings are of the zigzag type with neutral grounded. While the high sides of the transformers are not fused or provided with automatic breakers, the low sides are protected with automatic trip breakers operating on reverse current from the main bus. These breakers are of 1,200-amp. rating and are mounted in brick boards which line up with the main feeder board. These boards also provide space for mounting disconnect switches on both sides of the oil circuit breaker and for two sets of current and potential transformers, one for the relays and one for the metering.

Control panels for the transformers contain thermal demand ammeters, recording and demand wattmeters, a temperature indicator, voltmeter receptacles and oil circuit breaker controls.

Angle-iron construction is used for the feeder switchboard, with slate control panels mounted on an extension in front of the main board. The main bus is of ½x2-in. copper bar with ebony asbestos wood barriers between phases and on the outside. Barriers are also used between the disconnect switches for all feeders. Similarly, oil switch cells are inclosed except on the back.

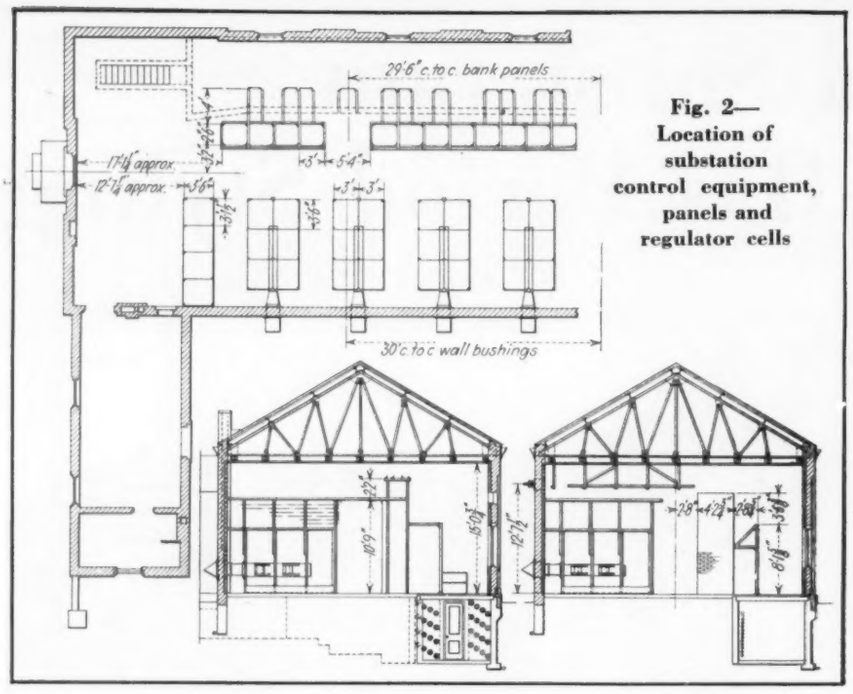


Fig. 2—Location of substation control equipment, panels and regulator cells

The main 4,600-volt wiring between the various pieces of equipment in the panels is of single-conductor cable with varnished cambric insulation and a fireproof braid. Wiring from the switchboard to the regulators and back to the pothead on the outgoing feeder cable is of the same type of cable, supported by porcelain cleats on angle-iron framework.

Sectionalizing panels with non-automatic oil circuit breakers of 1,200 amp. rating are provided between the bus sections supplied by individual transformers. Normal operation is with the sectionalizing switches closed.

Feeder panels are equipped with automatic trip and automatic reclosing oil circuit breakers of 600 amp., 15,000 volt rating. These are of the d.c. solenoid-closing type, each breaker having its own rectifier for operation from an a.c. source. Current transformer trips and mercury timers are arranged to give three reclosures of the breakers before being locked out. Stick-operated disconnects are installed between the bus and oil switch.

The control panel for each feeder is equipped with three thermal demand ammeters, control switch for the manual operation of the oil circuit breaker, lock-out relays, test switches and voltmeter receptacles for use of portable instruments, auxiliary equipment for regulator control and switches for the

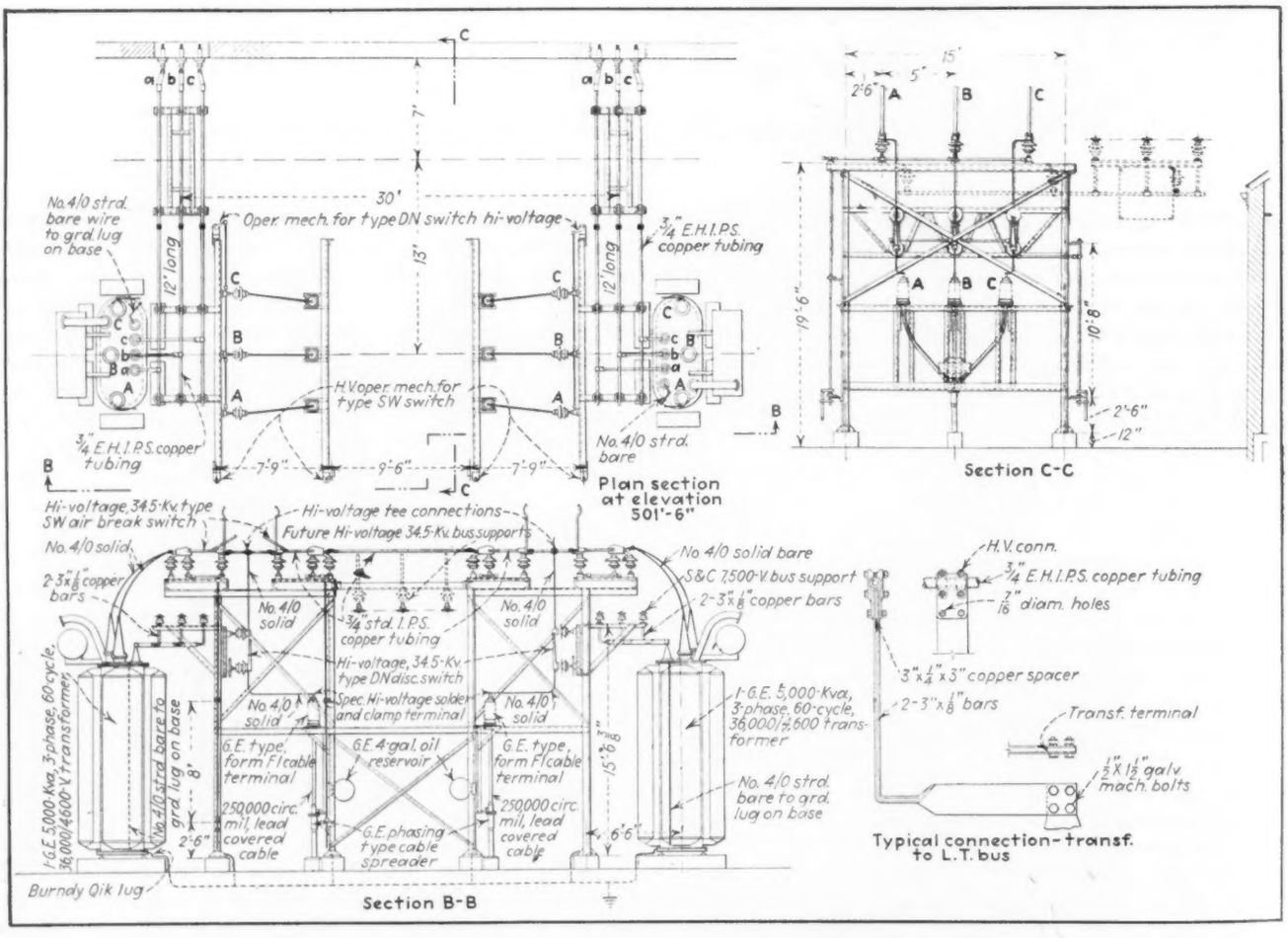


Fig. 2a—Layout of electrical equipment, 33-kv. outdoor, in sections

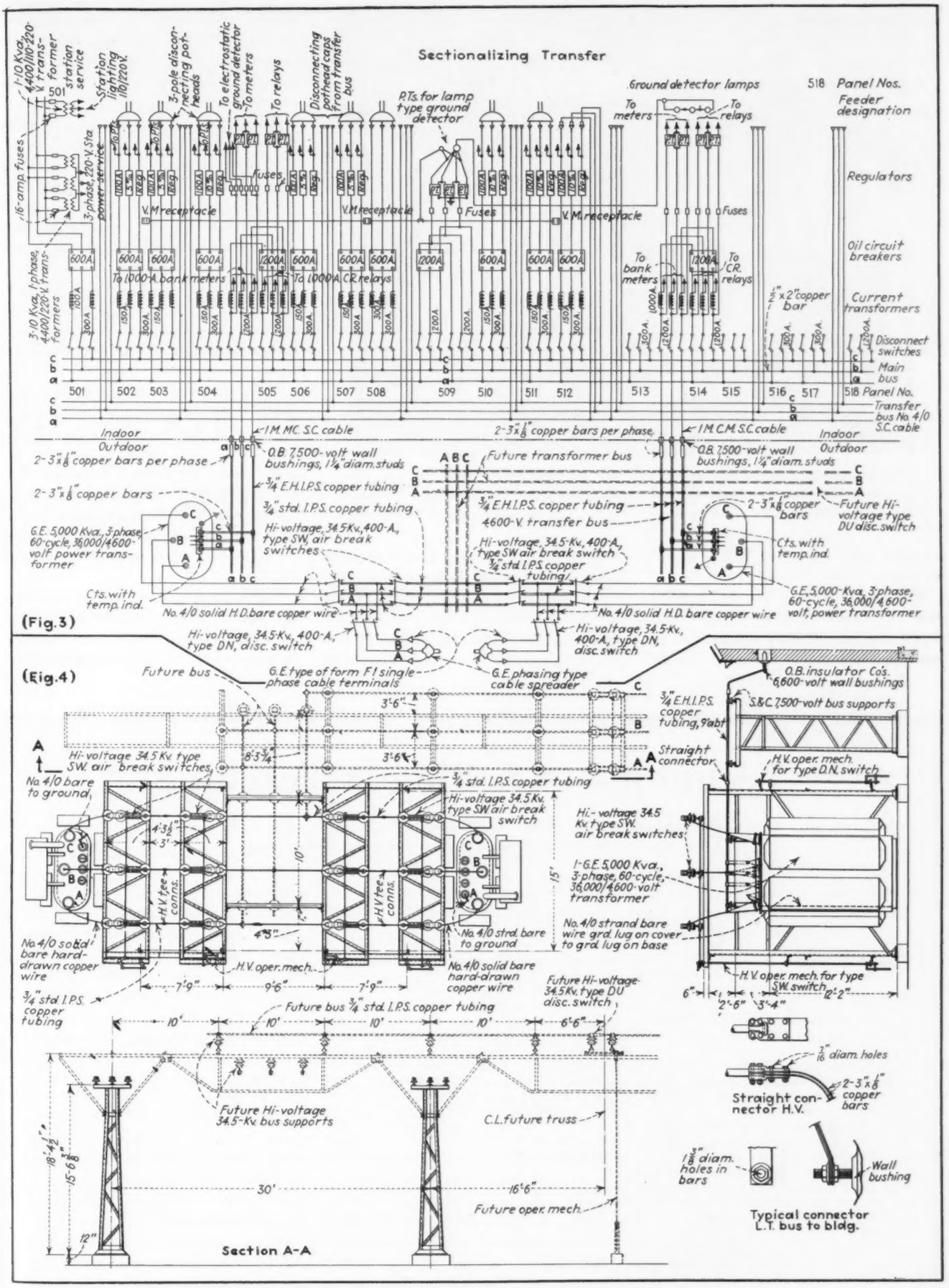

Sectionalizing Transfer
Ground detector lamps
To meters
To relays
518 Panel Nos.
Feeder designation
Regulators
Oil circuit breakers
Current transformers
Disconnect switches
Main bus
Transfer bus No. 4/0 S.C. cable
Indoor
Outdoor
1-M.M.C. S.C. cable
2-3"x1/8" copper bars per phase
O.B. 7500-volt wall bushings, 1¼" diam. studs
3/4" E.H.I.P.S. copper tubing
3/4" std. I.P.S. copper tubing
Future transformer bus
4600-V. transfer bus
Hi-voltage, 34.5-Kv, 400-A, type SW air break switches
Hi-voltage, 34.5-Kv, 400-A, type SW air break switch
2-3"x1/8" copper bars
Future Hi-voltage type DU disc. switch
G.E. 5,000 Kva., 3-phase 60-cycle, 36,000/4600-volt power transformer
Cts. with temp. ind.
No. 4/0 solid H.D. bare copper wire
Hi-voltage, 34.5-Kv, 400-A, type DN, disc. switch
(Fig. 3)
(Fig. 4)
Future bus
G.E. type of form F1 single-phase cable terminals
G.E. phasing type cable spreader
O.B. insulator Co's. 6,600-volt wall bushings
S.&C. 7,500-volt bus supports
Straight connector
H.V. oper. mech. for type D.N. switch
Hi-voltage 34.5 Kv. type SW. air break switches
No. 4/0 bare to ground
No. 4/0 solid bare hard-drawn copper wire
H.V. oper. mech.
H.V. tee conns.
1-G.E. 5,000 Kva., 3-phase, 60-cycle, 36,000/4600-volt transformer
No. 4/0 strand bare wire grd. lug on cover to grd. lug on base
Future Hi-voltage 34.5 Kv. type DU disc. switch
Future bus 3/4" std. I.P.S. copper tubing
Future Hi-voltage 34.5-Kv. bus supports
C.L. future truss
Future oper. mech.
Section A-A
1/16" diam. holes
Straight connector H.V.
3/8" diam. holes in bars
Wall bushing
Typical connector L.T. bus to bldg.

Fig. 3 (above)—Design of main connections of 36,000/4,600-volt step-down

Fig. 4—Layout of electrical equipment, 33-kv. outdoor, plan and elevations

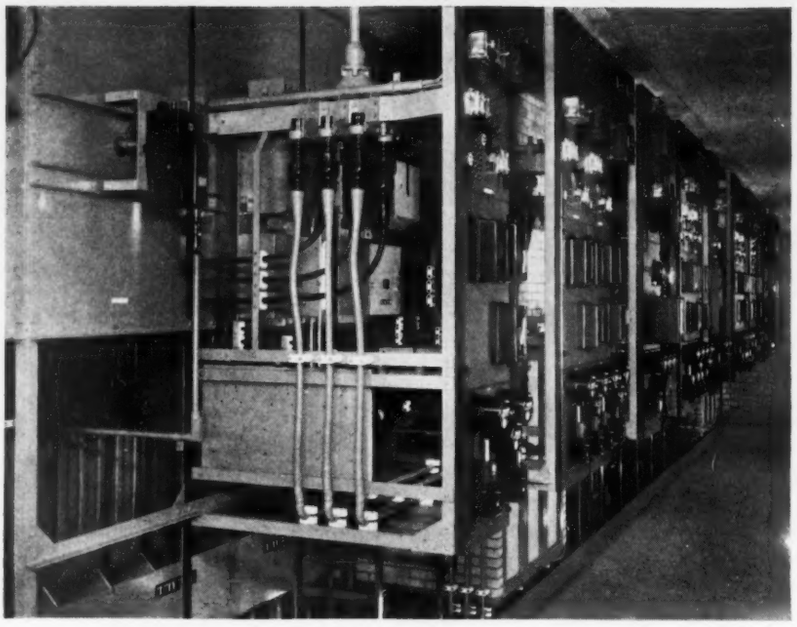


Fig. 5—In the foreground are shown the flexible leads taken off No. 4/0 cable transfer bus for each pair of feeder panels and pothead caps. These leads are left slightly slack to insure a good connection in the pothead cap

rectifier and regulator motor supply circuits.

A transfer bus of No. 4/0 cable is run the entire length of the switchboard and supplied by standard feeder equipment. A tap is taken off this bus for each pair of feeder panels and pothead caps of the disconnecting type are installed on flexible leads. These are located between the potheads for cables of two outgoing feeders so that by interchanging the caps any outgoing feeder can be supplied from the transfer bus. Then, by opening the disconnects, the complete feeder panel equipment, including the regulators, can be de-energized for maintenance work.

Each light feeder is provided with three single-phase, 100-amp., 5 or 10 per cent regulators. Each regulator is located in an individual sheet steel cell inclosed on three sides, cells for six regulators being constructed as a unit. The open side has a low removable plate at the bottom to prevent oil from getting out of the cell. Drains are installed from each cell to an outdoor oil pump to carry away the oil in case of damage to case of any regulator.

Each group of regulator cells is provided with a ventilating duct from an opening in the building wall. These ducts lead into the rear part of the cells near the floor. Provision has been made for the installation of a fan for each unit of six cells should sufficient ventilation for the feeders, when fully loaded, not be secured by natural draft.

Three single-phase transformers supply power to the regulator motors and a single-phase transformer handles lighting and miscellaneous controls.

Technique of Selling Is Teaching

In a recent address before the Michigan Electric Light Association T. F. Gessner of the Detroit Edison Company laid down the dictum that:

"Teaching techniques are the only possible methods that may be used to promote voluntary purchases. Any other techniques only result in a forced purchase by the customer and, of course, this is not selling."

First, he set down three axioms in the sale of electric service:

1. The standards of living of a family or community are substantially raised by the increased use of electrical appliances; and as a corollary to that,
2. The salesman does the customer a favor and a very real service when he sells that customer an electrical appliance.
3. The electric utilities have an obligation to educate the public to use more appliances so as to continue the tradition of voluntary reduction of rates and to raise standards of living. In addition to the profit motive in the promotion of electric service, there is a definite obligation to increase the per capita use of our service.

Then he enumerated the steps the prospect goes through mentally before committing himself to a purchase:

1. The prospect learns or discovers or is reminded of the advantages and reasons for owning the product.
2. These reasons accumulate in the prospect's mind to such a point that they appear so overwhelming to the prospect that the prospect decides (a) that he prefers to spend his money for this product instead of for another product that this money might buy, or (b) that his desire to own this product is stronger than his desire for the feeling of financial security that having the purchase price in the bank or in his pocket will give him.

After further parallels between the psychology of pedagogy and of selling he listed the following channels by which the utility can educate the electric public: Public utility employees, architect-builder, electrical contractor, fixture dealer, department stores, hardware dealer, furniture stores, electrical specialty dealer, state agricultural colleges, county agricultural agents, grange, publications—news items, jewelry stores, drug stores, farm implement dealers.

Methods of utilizing these channels are: Co-operative advertising mentioning dealers, meetings for special groups, window displays, contests for employees, contests for public, speakers for clubs, dramatic plays and presentations, sampling, trial installations, home demonstrations, store demonstrations, news items to household editors.

Fairly definite is the conclusion that such an attitude toward selling would enrich the results in all departments of utility selling.

Best in Baseball Lighting at Low Cost

By E. K. ALBERT

Superintendent of Transmission and Distribution, Northwestern Public Service Company, Huron, S. D.

WHEN the plans for lighting the Mitchell ball park were in the making our company was asked for recommendations on a suitable installation and for information on approximate costs. In making our recommendations we advised that we did not care to specify any particular make as there are a number of manufacturers of first-class units. We did, however, recommend open-type units in order to keep the first cost to a minimum. We also felt that we could improve the installation and at the same time keep the first cost low by designing the supporting structures and the electrical circuits. We stressed the importance of requiring all manufacturers to guarantee both the foot-candle intensities on the playing field and the height of the light ceiling.

The lighting equipment finally purchased consisted of 120 1,500-watt open type reflectors, which are mounted on eight towers. Towers are located two behind and to the side of home plate, one behind first and third base and four in the outfield. This part of the installation is in accordance with accepted standards. The lowest units are 64 ft. above the ground. The towers are the unusual feature of the installation. Lamps are rated at 115 volts and are operated at 125 volts, which gives 132 per cent of the rated output in lumens with 114 per cent of rated consumption and 35 per cent of rated lamp life. Foot-candle intensity on the ground in the infield is 25 and in the outfield 15 to 20. Players report the installation a very good one to play under.

Energy for the installation is metered at 2,300 volts, three-phase. Our company supplied the metering equipment, a 2,300-volt master switch, the primary circuits and the transformers. The baseball club supplied the towers with platforms for transformers and pole space for primaries, the lighting units and all secondary wiring.

Where Indian camp fires gleamed

Based on 60 games with the lights on for an average of 2½ hours per game the annual revenue from this floodlighted ball park will be approximately $1,000. Although the load is on over the evening peak, it is attractive because it is on during the period of the year when normal evening peaks are relatively low. For eight months of the year the transformers are available for use as spares in case of emergency.

The eight towers supporting the units are built of two 80-ft. and one 60-ft. red cedar poles, all with 8-in. tops, with fir cross braces between. The 80-ft. poles are set 10 ft. in the ground. Lighting units are mounted on 20-ft. 5¾x7¾-in. crossarms. The two towers back of first and third base each carry 23 units, and the other towers 11 and 13 units each.

Early in May, this year, the Mitchell, S. D., Baseball Association, member in the Nebraska Baseball League, purchased a 200-kw. floodlighting installation for its playing field. The job cost less than $5,000, but is far superior to the average in class C and D league ball parks. And the number of lighting units can be increased a third on the present structures if more light is wanted in the future.

The cost of the installation to the ball club is as follows:

120 lighting units and lamps	$2,118.00
Material for wiring units	100.00
Labor for wiring units	80.00
Poles, braces, etc., for 8 towers	1,809.73
Labor erecting 8 towers	576.23
Total cost	$4,683.96

The supporting towers are unique in that they perform three important functions: Provide a solid structure for mounting and working on the units;

[*Continued on page 119*]

How to Get Going on the Home Lighting Job

Many electric utilities have found, many are still finding, that the hardest part of home-lighting promotion is to get the thing started. They make a lot of work of it, but it is really very simple, as is proved by this monologue lifted out of the transcribed proceedings of the recent Home Lighting Conference sponsored by the Women's Auxiliary, Chicago Section, Illuminating Engineering Society, and the Chicago Lighting Institute.

By BLANCHE KERR
Central Illinois Gas & Electric Company, Rockford, Ill.

NATURALLY when you start a lighting department, the first thing you have to do is get somebody to be the department. You can't be the department all by yourself, although sometimes you think you can, sometimes you think you are.

I had to get some girls from Rockford. The first day, I went to the man who says "yes" or "no" to all your brilliant ideas, mostly "no," and said: "Mr. So and So, what do you want this lighting department to do?" It is nice to know from the beginning what they expect of you.

He said: "I don't want you to keep a lot of records. I can't stand looking at records. I want to know how many calls the girls make, what the added wattage is, the number of demonstrations made, what the request demonstrations are, and so on." He didn't want very many records.

I said: "Do you want to make money on this lighting proposition?"

He said: "Yes, eventually, but we realize it takes a little time."

That was a very big lift to my spirits, because you know it takes a lot of time for people even to get the lighting idea. I said: "You realize that it is more or less an educational movement in the beginning."

Having been born and bred in the Lighting Institute and taking Commonwealth Edison Company as my model, with their Thursday afternoon teas, I always had the idea that any woman, no matter who, would go any place for a cup of tea and a cookie, and that is very successful in most places. We started out having Thursday afternoon teas, and presenting a little skit.

By the way, I had three girls. A month ago I got another one, so now I have four, but all this time I had three. We started out in a conservative manner. We all laugh at it, but it is better to start small and grow than it is to start big and go down to nothing.

In our first group we had five people in attendance. That didn't faze me very much, because that was the way it started in the Lighting Institute. In the next group we had seven, and I thought that was some better, but in the third group we had two.

What was the next thing to do? We decided to give talks to the women's clubs. Well, they wouldn't have me. They are a very select group. This was a commercial idea, and they simply wouldn't have it.

Relighted ten schools

I started with the church societies. I had great success with the church societies, and very good success with the Parent-Teacher Association. Believe it or not, after a while they became interested in the idea. Remember, we had nothing to show them. All I could take was a lighting kit and an I.E.S. floor lamp. The big moment is when I *turn the I.E.S. lamp over and point it at them like a gun,* and of course they get this flood of light in their eyes, and they get the idea that maybe the bare bulb is not so good and maybe there is something to this I.E.S. lamp.

We had the Parent-Teachers all set on the idea, so they started an investi-

Better Light-Better Sight Display at the

gation in the school and last fall we relighted ten schools. This fall we think that we will probably get the rest of them. There was a sale of 400 units to the schools for that relighting job.

That was pretty nice, but still lighting wasn't going so hot. Out of the number of groups we talked to, the percentage of demonstrations wasn't large enough. I decided the groups were too big. I couldn't get the story over to each one individually, so I thought I would take the small groups. I went through the society page of the newspapers and to the Chamber of Commerce, for the Tuesday Club, the Happy-Go-Lucky Club and the Jolly Sisters, and all those seven or eight who meet once or twice a month, or once a week. I got them all.

They wouldn't come down to the nice little auditorium we had in the building, I should say not. I had to go out to them. I took my little kit and my lamp and the set of slides that shows the Bliss home in Cleveland, showing the old home, and all that changes made just by lighting. That made quite an impression. Out of these people, 70 per cent had demonstrations.

Demonstrations for one-sixth

Still we weren't letting enough people in Rockford know that we had a lighting department. Things got to such a pass (and I think maybe this happens too in your company) that when something had to be done in the company, maybe a survey had to be conducted, or something of that sort, they said: "We will have the lighting girls do that," or "We will have some of the lighting girls do it and the rest can go on."

Last January I was getting more and more disgusted. We had tried teas, talks, cold canvassing, sending out letters before the adviser came. much advertising and radio broadcasting, leaving the sight meter overnight and having the girl pick it up the next morning. Nothing worked.

I went to 50 girls in the general office and said: "If you will give the names of ten of your friends you can have an I.E.S. floor lamp, if they let us make demonstrations." Out of the 50, eight gave me the names of their friends. The catch in it was that the demonstration was to be made before the lamp was given. We told them the women would have to set the day and set the time. That was tough at first, but they got the idea and the girls started going out.

Pin-it-ups for premiums

I said to the lighting girls: "When you go to each of these houses tell those women if they give us five names and those demonstrations are made we will give them a Pin-it-up lamp." In two weeks we had more demonstrations than we could handle. These women would not only give us the names, they would tell their friends what the demonstration was and to be prepared for us when we came. We were received with open arms.

The first two weeks the girls almost collapsed. It was hard to believe that actually those women were waiting for them to call, and lots of times, when those women had a definite appointment at a definite time, if the girl wasn't there on the mintue, a telephone call would come into me: "Where is that home-lighting girl?" We get a lot of that.

Here we are with these three girls, and all along we have been having 300 demonstrations to make. Up to this time, these girls have made 562 demonstrations, which is an average of between fifteen and eighteen demonstrations a week. That is too much. Our girls do not have cars. We do not merchandise. They have to go by bus or street car. These women have to give them names so the girls can reach them in the city. If it is anybody in the suburbs, it doesn't count.

Demonstrations for 12 cents each

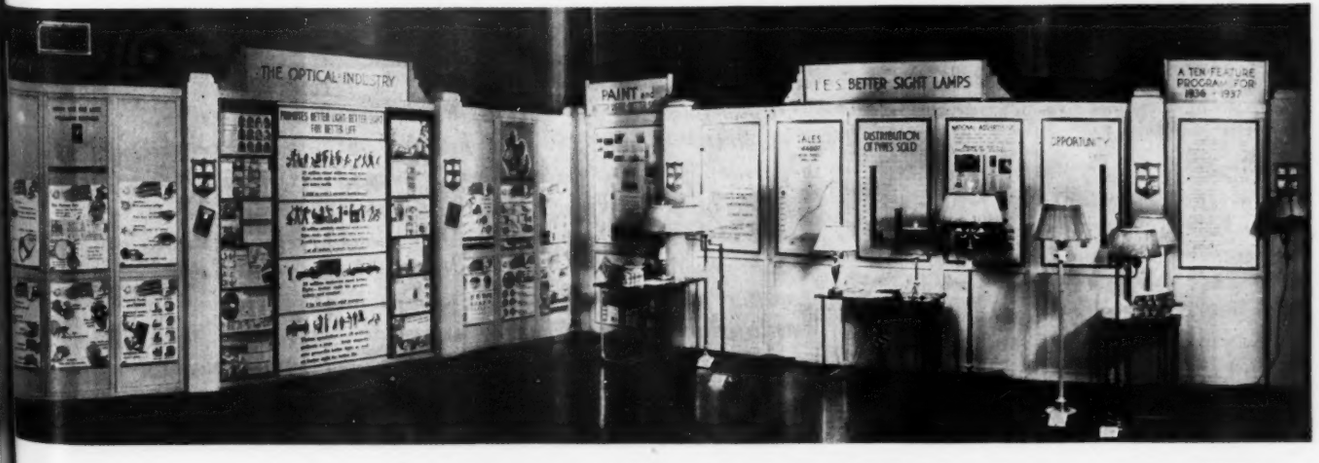
So effective are these demonstrations now that people living outside of the city call up and ask if they can come in and pick up Miss Smith or Miss Madison and ask her to give a demonstration. You don't have to believe it. Nobody else did for a while, either.

It cost us 12 cents each to get those demonstrations. I might tell you that for five names handed in by the customer when the demonstrations are made, we give a Pin-it-up lamp. For ten demonstrations we give a font Pin-it-up.

In the three months we have given away five floor lamps to the girls in our office, 22 Pin-it-up lamps and 17 font Pin-it-ups. Do you think those women are handing in five names? I should say not. If they give us twenty names, as some of them do, they get a floor lamp, and some of them say, "I am sending you a few extra, because I think this is a very nice service."

We got 562 demonstrations out of that, and that is a cheap enough operation, isn't it? We don't do the work, because the hardest part is getting into the home, and who sells the idea? The customer. The customer has had the demonstration. She knows what it is. So she likes it. She tells her friends about it, and the friend knows what to expect and she likes it."

Bureau Had Comprehensive E.E.I. Convention



Head roller directs hot-roll process by this nerve-center panel

Bethlehem's 72-In. Sheet-Strip Mill

Centralized Control, Interlocking, Short-Circuit Protection, Heavy Power Concentration Feature Latest of Wide Strip Electrifications

By F. D. EGAN

Superintendent Electrical Department, Bethlehem Steel Company, Lackawanna, N. Y.

ELECTRICAL energy for operation of the new 72-in. hot and cold strip mill of the Bethlehem Steel Corporation at Lackawanna, N. Y., is obtained from the Niagara-Hudson network through a modern outdoor substation installation of 15,000 kva. capacity, augmented by 10,000 kva. capacity in two lines from the original power system of the Lackawanna plant. This energy is transmitted to the electrical drives through a primary bus and switching installation consisting of 22 high-speed, 500,000-kva. interrupting capacity oil switches, housed in a compact metal-clad structure. Electric energy for the roughing drives in the hot mill is utilized at 6,600 volts, three-phase, 25 cycles.

The motors driving the roughing end of the hot mill consist of 6,600-volt, three-phase, 25-cycle units rated as follows:

No. 1 Scale Breaker	1,000 hp., 375 r.p.m., squirrel cage
No. 1 Stand	3,000 hp., 150 r.p.m.†
No. 2 Stand	3,000 hp., 500 r.p.m.*
No. 3 Stand	3,000 hp., 500 r.p.m.*
No. 4 Stand	3,000 hp., 500 r.p.m.*

† With flywheel mounted on motor shaft.
* Two flywheels mounted on pinion shaft.

All the roughing stand motors are wound-rotor induction, provided with Lewis type slip regulators for limiting the starting and peak-load currents. These induction motors are stopped by imposing direct current on the alternating-current windings, resulting in a modified form of dynamic braking.

Two a.c.-d.c. motor-generator sets of 6,000 kw. capacity each furnish direct-current energy for the finishing stand motors, as well as the variable-frequency, motor-alternator sets for the hot mill runout table. The finishing stands are driven by 600-volt, direct-current, adjustable-speed motors of the following rating:

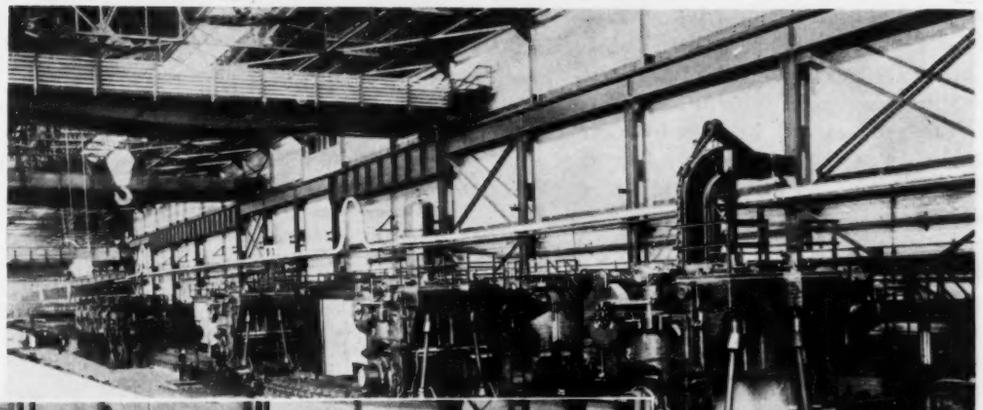
No. 2 Scale Breaker	500 hp., 150/600 r.p.m.
No. 5 Stand	3,500 hp., 175/350 r.p.m.
No. 6 Stand	3,500 hp., 175/350 r.p.m.
No. 7 Stand	3,500 hp., 175/350 r.p.m.
No. 8 Stand	4,500 hp., 125/250 r.p.m.
No. 9 Stand	4,500 hp., 125/250 r.p.m.
No. 10 Stand	2,500 hp., 175/350 r.p.m.

All these d.c. motors, along with the four generators, form an extremely heavy concentration of d.c. power on this short run of hot mill bus, totaling 38,500 hp. On this bus would be developed, in the case of short circuit, a current in the nature of 320,000 amp., which would produce an estimated separating force of several tons per foot for ordinary bus separation. Since this force is inversely proportional to the bus separation this installation was made with buses placed at several times normal spacing. To gain this wide spacing positive and negative buses were located on opposite sides of the bus room. The lateral stiffness was increased, as well, by the use of aluminum channel, back to back, strongly braced against the foundations.

The rotating machines either feeding this bus or supplied with energy from the bus are protected by specially designed, high-speed operating, direct-current circuit breakers, incorporating the "rate of rise" feature of instantaneous overload trip on short circuit. Positive and negative circuit breakers also are located on opposite sides of the bus room, below the buses.

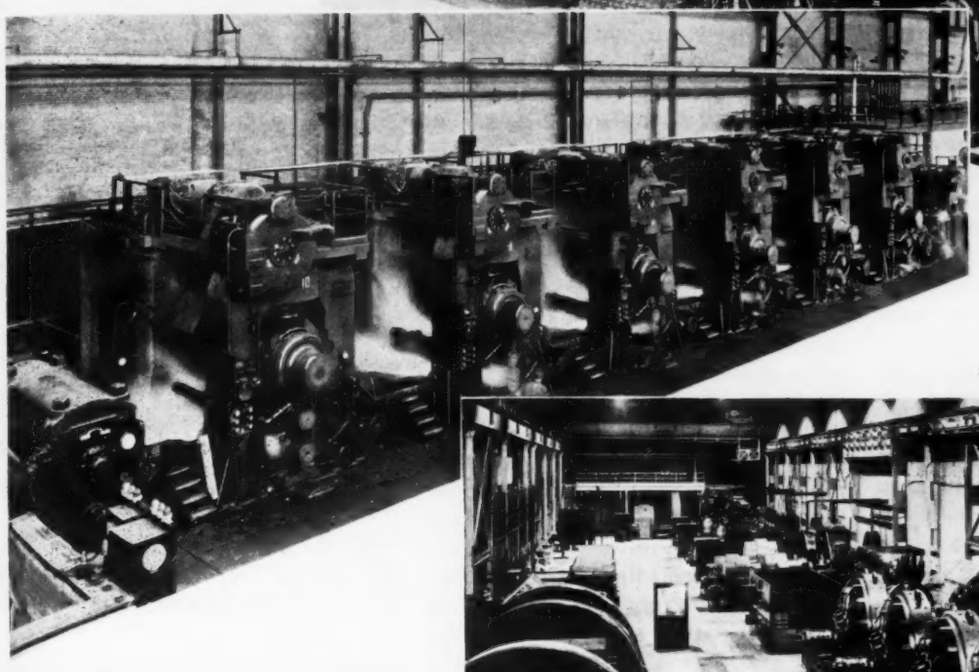
In order to dissipate the heat generated through heavy loads imposed on the main drive motor and generator equipment a unique system of ventila-

Modernization and development in rolling mill machinery to meet the present-day demands for output, quality and surface perfection in flat rolled sheet steel and strip products has been made possible through the development and application of special electrical equipment. Innovations are found in bus design, high-speed d.c. breakers, ventilation, sequential starting of table motors, instrumentation. A comprehensive picture of this development and application is presented in this recital of the installation at the Bethlehem Steel Corporation's new 72-in. hot and cold strip mill at Lackawanna, N. Y.

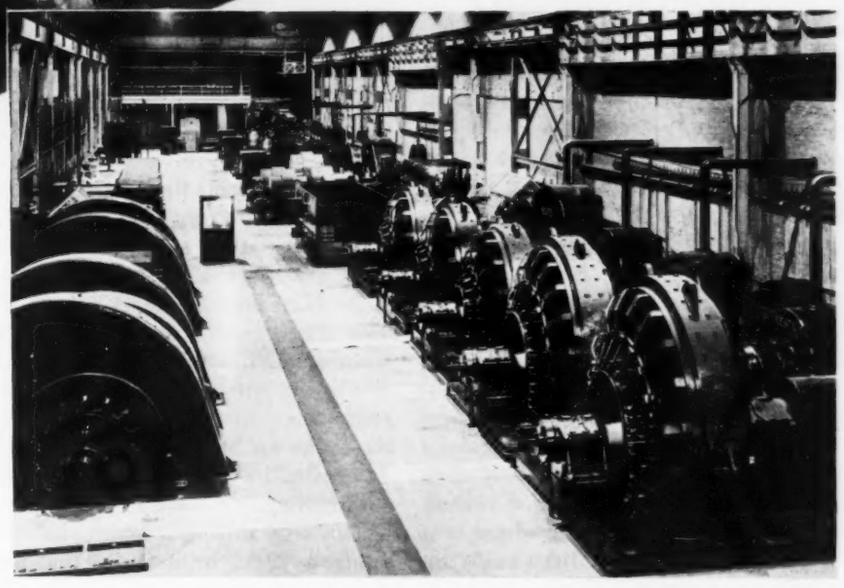


Roughing train reduces slabs from 4½–5 inches thickness to ⅝–1¼

Finishing train turns out strip 72 inches wide at 1,350 feet per minute



Twelve roll stand motors total 36,000 horsepower. These drive the ten roll stands and two scale breakers



tion is provided utilizing the principle of air recirculation. Clean air is picked up in the motor room, through natural fanning action of rotating machines, which ventilates the machines and is discharged into the foundation pits, under each machine, at the end of which is a surface cooler through which the air is pulled by the suction action of conoidal blowers, and again discharged into the motor room. These surface coolers require the use of 1,869 gal. of water per minute to cool the 340,000 cu.ft. of air which is recirculated through them per minute. To offset any losses in air in the motor room and maintain a slight positive pressure, make-up air fans are provided at each end which take outside air through a filter-cleaning equipment and discharge it into the motor room basement.

Coilers are equipped with specially designed, flange-mounted, water-cooled motors of speed range varying from 20 to 60 cycles with 147 to 440-volt service. The coilers and runout table from the mill are equipped with control of such flexibility as to handle the strip as it leaves the mill at high speed and conduct it successfully into coiler and wind it into uniform bands for further processing.

When the mill is rolling cut-to-length strip or plate sections, material is conducted to automatic piler at the extreme end of the runout table or across the cooling bed to shearing and trimming units. The rollers on the cooling section of the hotbed are arranged so that one flange-mounted motor drives two rollers each. The sections of the hotbed approaching or leaving the trimming or cutting units are arranged for variable-speed regulation by variable frequency and other sections of the hotbed are operated on fixed speed at constant frequency. There is a total of 904 motors in this section of the mill driving table rollers only.

Power for the variable-frequency, variable-speed table motors is provided by six motor-alternator sets. The design of these sets is special for the service. Each set consists of:

Two 125/250-hp., 300-volt, 400/1,200-r.p.m., adjustable-speed, d.c. motors, connected in series.

One 166/500-kva., 50 per cent power factor, 147/440-volt, 20/60-cycle, separately excited alternator.

The alternator is direct coupled to

and located between the driving motors. The complete layout is designed for low inertia effect, to permit rapid acceleration and deceleration of the set.

Control for the variable-frequency table drives is arranged so that the feature of group starting can be utilized with four definite timed groups on each set. All motors are started at base frequency on the line and increase in speed as the motor-alternator is speeded up to 60-cycle speed through field weakening on the d.c. driving motor. In like manner, the table drives are decelerated from 60-cycle speed to speed corresponding to base frequency of 20 cycles. This is effected through slowing down the alternator set, thus pumping back regenerated energy into the 600-volt system. Then the motors are cut free from the alternator set and direct-current dynamic braking is applied.

In order to produce a salable product close inspection is required of the hot material at coilers and pilers and a means of rapid communication between inspector and roller on hot mill proper is required. This is accomplished through the installation of a "synchro-tie ship control system," with one sending unit located at the inspector's stand in the coiler pit, one sending unit at the piler and a receiving unit at the roller's stand on the finishing mill. This system, over which more than 40 different messages can be sent, keeps the roller accurately informed as to the surface, gage and widths of the product being rolled.

Finishing temperatures form an important factor in the physical properties of the strip to meet the customer's specifications, so the inspection division is accurately informed on rolling temperatures through the medium of a graphic high-speed "Micromax" recording pyrometer with sensitized cell focussed on the strip as it leaves the finishing stand. Another sensitized cell focussed on the strip at the entrance to the finishing stands furnishes the heater, by means of an indicating pyrometer, an index for controlling the temperature of the slab furnaces.

Dancing roll rheostat

Coils of strip rolled in the hot mill are conveyed to the coil storage at the end of the continuous pickling building. From the storage they are taken to the pickling lines, where they are stitched together to form a continuous ribbon of steel as they are driven through the tanks by pinch rolls. A feature in the control of the speed of the strip through the pickling tanks is the use of a so-called dancing roll rheostat. The dancing roll rides the strip and is so connected to a rheostat that by field control of the entrance pinch roll motor the strip is kept in the solution and the tension kept at the proper value so as to prevent tearing of the stitch.

Another control feature involves the use of an additional interlock on the undervoltage relays of the controls of both the two-pinch roll motors and the up-coiler motor. These interlocks are all connected in series with a contact on the dancer roll limit switch, so that if one of the driving motors mentioned is tripped out on an overload, or the sheet reaches too high a level in the tanks (*i.e.*, becomes taut) all the motors are immediately stopped. This feature, too, aids in preventing delays, due to the stitch tearing, necessitating rethreading of the line. On leaving the tanks the strip is cut into lengths and coiled by the up-coiler for tandem cold rolling.

This cold rolling is accomplished in either a 72-in. or a 54-in. four-high, three-stand tandem mill. Each stand is driven by a 1,250-hp., adjustable-speed, 300/600-r.p.m., d.c. motor provided with starting, dynamic braking and reversing by Ward-Leonard control of a 6,000-kw. motor-generator set, similar to those in the hot mill. Since it is extremely essential that the thickness of the strip rolled in the tandem mills be kept within close limits, it was necessary to provide a quickly and easily controlled screwdown, as well as electro-limit gages, continually and accurately to indicate the thickness of the steel.

Ward-Leonard control extensively applied

Ward-Leonard starting control has been featured through the entire mill. This method of starting, combined with two-to-one adjustable-speed motors, has furnished the necessary control requirements for the various skin pass mills, which include the following:

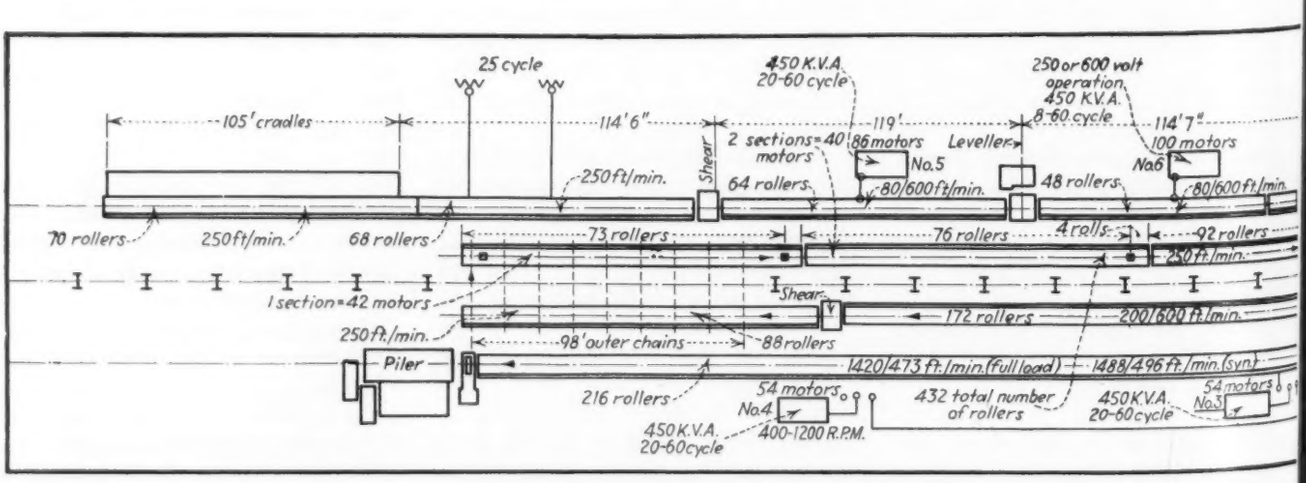
One 72-in. single-stand, four-high mill with reel.
One 72-in. single-stand, four-high mill without reel.
One 93-in. single-stand, four-high mill without reel.
One 54-in. single-stand, two-high mill with reel.

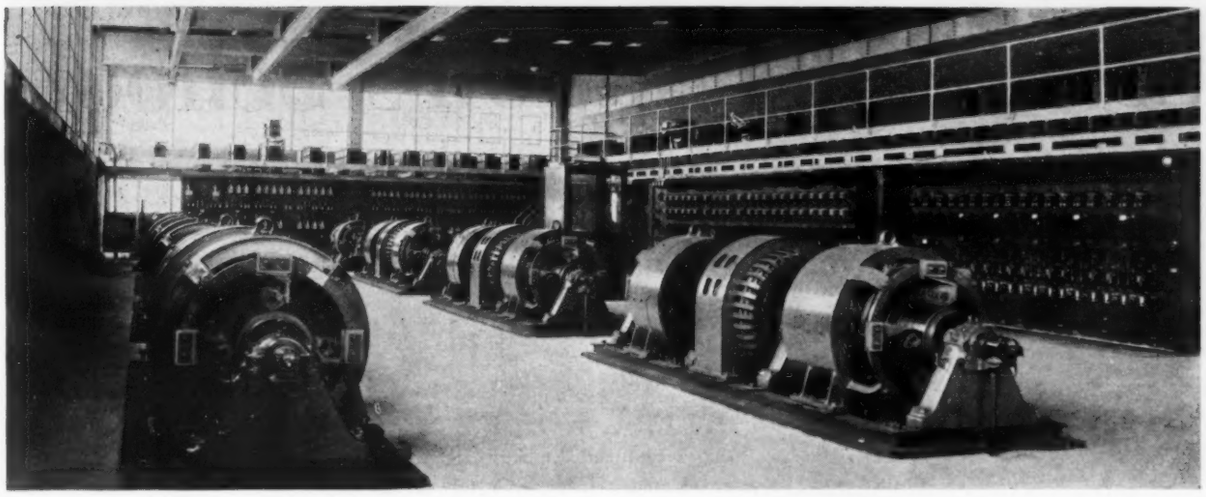
All the above stands except the 54-in. are driven by 1,250-hp., 300/600-r.p.m., adjustable-speed, 600-volt mo-

Variable frequency sets

This section includes 162 individually motor driven table rollers between the delivery stand and the two coilers. The speed range on this table varies from 480 to 1440 feet per minute to follow the delivery speed of the mill. The motors driving these rollers are specially designed gear type AC motors, 20 to 60 cycle speed, 147 to 440 volt service and arranged for forced ventilation, utilizing 100 cubic feet of air per minute for cooling.

The runout and hot tables are sectionalized and arranged as shown in the diagram below so that (see opposite page):





Variable-frequency motor-alternator sets housed separately

tors, furnished with d.c. power by motor-generator sets, the 54-in., two-high mill being driven by a 250-hp., 250-volt, 500/1,000-r.p.m., adjustable-speed motor.

Due to the exacting demands made by the users of sheet metal for surface perfection of finished product close inspection before shipping is required. For this inspection low-pressure mercury-vapor lamps were found to give the best illumination.

The art of illumination has been greatly advanced in the past few years and, as a result, it has been found that all types of work can be accomplished more accurately, more quickly and with a greater degree of safety if good illumination is provided. For this reason much attention was given to the illumination design of this plant. This application required the use of 300 porcelain enamel, highbay units, 225 silver-backed glass reflectors with spun-on steel covers, all of 750 watts capacity each. The tunnel lighting alone required the use of 210 units of 250 watts capacity each, built into the side walls. Besides these, more than 600 units, varying in size from 50 to 500 watts, were used.

500 miles of wire

To supply the many lights with power required the use of a bank of three 500-kva., 6,600/440-volt, 25-cycle, air-cooled transformers, along with 100 10-kva. and 52 7½-kva., single-phase, oil-insulated, 440/110-volt distribution transformers. All main lighting circuits are controlled by the use of circuit breakers provided with a no-voltage release feature, so that they can be tripped out by opening the 4,000-amp. air circuit breaker on the secondary side of the 6,600/440-volt transformer bank.

The hot and cold mills required the use of 1,847 rotating electrical machines, ranging in rating from 1/10 to 8,500 hp., which totals 151,326 hp. To install these machines and their control required 780,949 ft. of conduit and 2,793,679 ft. of wire.

Controls of all sizes and types are required to drive the many and varied types of apparatus used for this installation. Such control as the variable-frequency control of the hotbed runout table motors and coiler motors or the combination of Ward-Leonard and tension regulator control of the slitting units have greatly aided in the production of strip steel. But by the application of close speed regulation with widely varying loads, along with accurate speed adjustment of large high-speed, direct-current motors as applied to the six finishing stands of the hot mill and the main drive motors of the tandem cold m lls, the electrical engineer has made possible the process of continuously rolling sheet steel at high speed.

serve runout tables

MA-1 Alternator set drives 67 motors on A-1 Table.

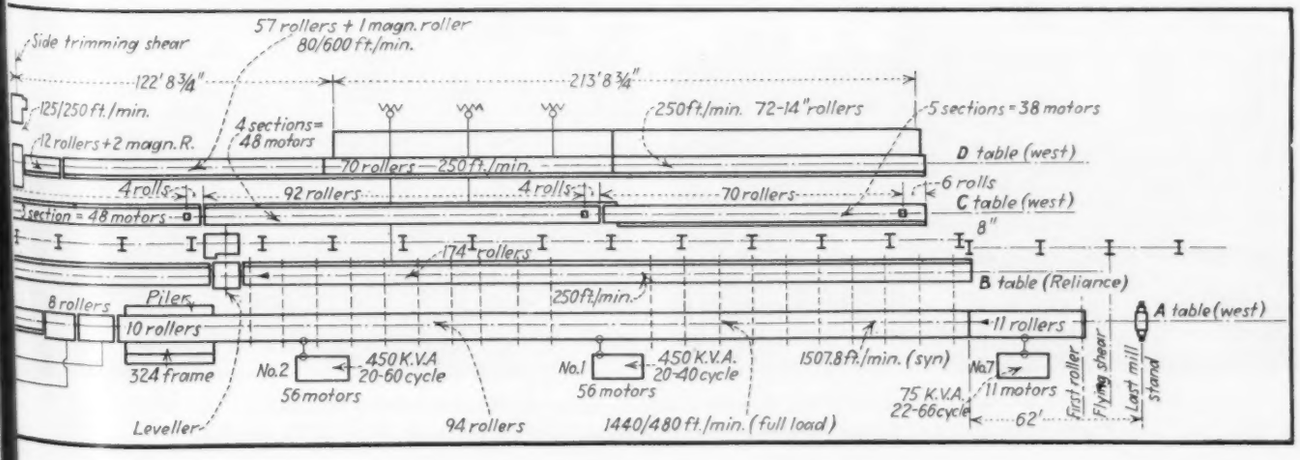
MA-2 Alternator set drives 56 motors on A-2 Table.

MA-3 Alternator set drives 5 motors on No. 1 Coiler and can be transferred to A-3 Table when not coiling.

MA-4 Alternator set drives 5 motors on No. 2 Coiler and can be transferred to A-4 Table when not coiling.

MA-5 Alternator set drives the processing section of the "B" Table Run.

MA-6 Alternator set drives the processing section of the "D" Table Run.



Let's Light Nation's Schools

Duquesne Light Recognizes the National Problem of Inadequate Lighting—Solves It in More Than 400 Pittsburgh Classrooms

By F. A. KOLB
Duquesne Light Company

PROBABLY nowhere else would the application of the basic ideas of the story of Better Light for Better Sight result in more genuine national benefit than in the schools. In the classrooms, where the visual habits of a lifetime are formed, the tasks demanded of the eyes are becoming more severe every year. Yet the illumination provided for these tasks has shriveled under the crossfire of smaller wattages to reduce bills and the prevalent belief that daylight can be brought indoors. The alarming toll which these conditions are exacting is indicated by the national figures on defective vision at various stages of educational progress. In elementary schools 19 per cent have defective vision, in h gh schools 28 per cent and in colleges 40 per cent.

That the time is right for a vigorous approach to this important problem on the part of the school authorities and the utility companies is illustrated by the active response in the Pittsburgh district to the promotional and educational activities of the Duquesne Light Company in the field of school lighting. As a result of this activity, the seeing conditions in more than 400 classrooms in 30 different school districts have been improved within the past year. The nature of this improvement has been such as to raise the artificial illumination on the desk top from an average intensity of 1 to 5 ft.-candles to a level which ranges from 40 ft.-candles in the sight-saving class down to 8 ft.-candles in the rooms where the new equipment is the poorest.

The school board, architect, educator and utility company can all meet on the common ground of better vision. It is the responsibility of the utility company to bring the story of better lighting for the protection of the eyesight of the students to the attention of all parties concerned. This can be accomplished by personalized mailings of non-commercial material which present, in an educational manner, the various factors involved. Most school board members are remote from the actual lighting conditions themselves, but they are interested in being of service to their communities. To such people the basic soundness of the story of light and seeing makes a genuine appeal if properly presented. The more active board members will often be interested in investigating conditions for themselves with a light meter. This will give them the opportunity of seeing that daylight will not do the job and that one cannot judge the amount of light for reading at the desks by looking at the windows.

Utility companies should, of course, perform all the necessary technical services which are required in the survey. Practical considerations will usually indicate the wisdom of concentrating attention on the poorest lighted school in a district rather than trying to improve an entire school system at one time. When the demonstration of

Left—Schoolroom with six 60-watt lamps in open shades, intensity 2 ft.-candles
Right—Six 200-watt lamps in 16-in. direct-inclosing globes, intensity 8 to 11 ft.-candles

Left—Classroom with four 100-watt lamps in 12-in. direct-inclosing globes, intensity 2 to 4 ft.-candles
Right—Four 300-watt lamps in semi-indirect units, intensity 8 to 11 ft.-candles

proper lighting equipment is made it will usually be found advantageous to hang both the correct and incorrect type of fixtures in the same room so that the board may grasp the idea of the importance of glare.

Any broad scale school-lighting program will have to recognize the wiring problem. It has been found that there are a large number of schools now equipped with lighting fixtures that provide 2 ft.-candles of illumination which have wiring capacity sufficient to supply a 10-ft.-candle system. If a new lighting system is installed which can be supplied on the present wiring the money available at this time can be spent for fixtures and the maximum lighting improvement for the investment made will be obtained. Care should be taken, however, to install equipment which will be adaptable to higher intensities when more wiring capacity is available. Table I indicates the conditions in a typical classroom and the results that can be obtained with various recommendations.

The amount of light required in a classroom will, of course, depend upon the tasks required of the students and the visual equipment which they possess. Readings obtained with two different measuring devices for determining the amount of light required by students for reading a standard classroom book are shown in Table II. In the first case a test kit which provided a variable amount of diffused light was used and the student asked to select the amount of light needed. After this selection was made the intensity was measured.

In the second case a Luckiesh-Moss visibility meter was used. This instrument resembles a pair of spectacles and in its use the student adjusts a movable element to the point where he can just barely read the particular task. On the basis of this point of threshold vision the required intensity can be calculated. While it is interesting to note that there is a marked similarity in the values obtained by these two different methods, this should not be construed as a verification of the accuracy of either method, but it would appear as though at least 20 ft.-candles should be provided.

"Sight-saving classroom" with six combination units, each containing 1,000-watt incandescent lamp and 450-watt mercury-vapor lamp, automatically controlled, intensity 40 ft.-candles

Since no lighting system is of any value unless it is used when needed, attention has been directed to automatic control so as to make the operation independent of the teacher. Many successful installations of photo-electric cells have been made for this purpose. Most of these installations have been in single rooms with the control operating either on all of the lights or with part of the room manual and part automatic. Consideration is now being given to the application of a single control unit to the entire side of a school building. Such an arrangement would require study of the method of handling the blinds and of the conditions outside the building which would affect the classroom lighting. The prevailing opinion of school authorities seems to be that teachers burn the lights more than they are needed. Comparative data on rooms with and without automatic control shows that the reverse is true.

Very few school boards will be willing to permit improper lighting to remain in their schools after they become

Table I—Lighting Recommendations

	Present Conditions in a Typical Classroom	Recommended for Good Lighting	Three Recommendations Which Can Usually Be Applied to Existing Wiring		
			1	2	3
Outlets	4 or 6	6	6	6	4
Lighting unit	10 or 12 in. direct inclosing	Indirect	16 in. semi-indirect	16 in. direct	16 in. semi-indirect
Lamps	100 watts	3-500 watts 3-300 watts	3-300 watts 3-200 watts	200 watts	300 watts
Branch circuit wiring	Two No. 14	Three or four No. 12	Two No. 14	Two No. 14	Two No. 14
Foot-candle intensity	2 or 3	15-25	9-13	8-11	8-11

Table II—Summary of Tests Made to Determine Required Intensity for Classroom Lighting

Showing the percentage of the students in each foot-candle group

Foot-candles Selected	With (1) Portable Kit Per Cent	With (2) Visibility Meter Per Cent
0-10	15	21
11-20	34	34
21-30	25	22
31-40	12	7
41-50	6	7
50-up	8	9
Median	21 ft.-candles	19 ft.-candles

(1) Tests made in Chicago public schools by Joseph Fleischer and A. J. Hoffman. Reported in paper "A New Approach to School Lighting," Illuminating Engineering Society, 1935.
(2) Tests made by Duquesne Light Company.

aware of the visual handicaps that result, for the American educational system has been created for the purpose of developing rather than destroying. In making an analysis of the costs of remedying the lighting conditions in their schools, most school boards will be interested in knowing what increase in electrical consumption will result. The experience of 25 different schools in the Pittsburgh district has been that the annual increase in energy used varies from 300 to 500 kw.-hr. for each 1,000 watts of additional classroom lighting. Any comparison of kilowatt-hour consumptions should, of course, segregate the energy used for power purposes, for most school boards have the impression that most of the kilowatt-hours purchased are used for lighting, whereas the figures show that, particularly in larger schools, the power consumption exceeds the lighting consumption.

Crosley Lighting Saves a Third

By JOHN MICHELSEN
Electrical Engineer Crosley Radio Corporation

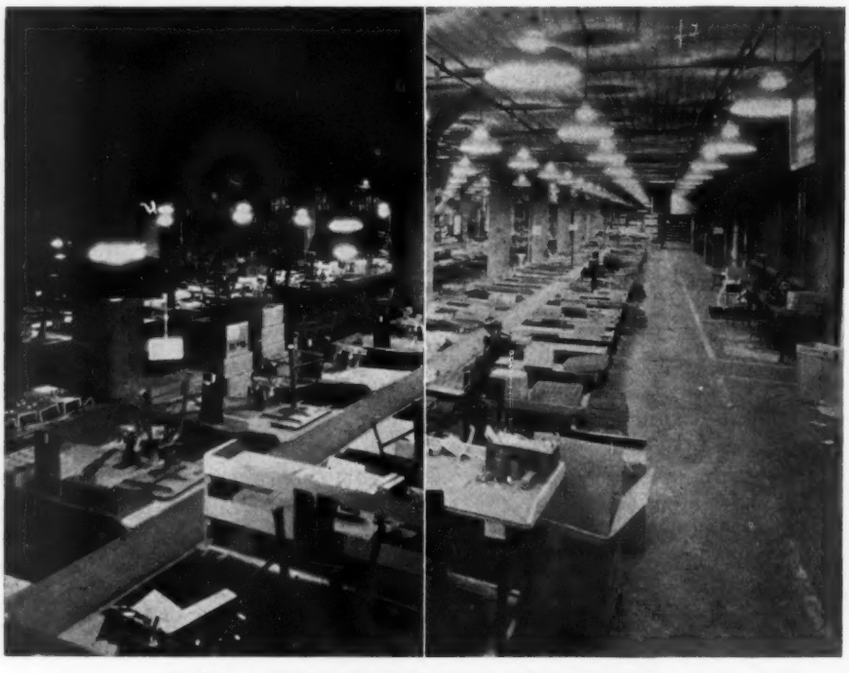
BRINGING almost the equivalent of daylight illumination into the factory of the Crosley Radio Corporation, Cincinnati, Ohio, with an electric consumption of approximately 3.6 watts per square foot of production area is the achievement of the engineers in the maintenance department of the Crosley Radio Corporation, in co-operation with illuminating engineers of the Union Gas & Electric Company.

It is estimated that the entire cost of the installation will be paid for in five years by the savings it will effect over the old method of having to change the illumination of the different departments every time a change is made in production plans and facilities. In addition, there is the great saving in eye-strain caused by improper illumination and shadows of the old system, with consequent gain in efficiency of the workers. The Crosley program embodied the following four steps:

1. An even light over the complete floor of approximately 25 ft.-candles.
2. The least amount of shadows.
3. The least amount of glare.
4. To use the present fixtures now in the plant as much as possible.

Tests were made for a month and it was found that lights hung 9 ft. high in a pattern gave an even illumination over an entire floor. The bays are 21x20 ft. 6 in.

It was found that the fixture just recently introduced by the Graybar Company gave the best light which could be purchased. Because of the low ceiling height of 11 ft. it was practically impossible to use any other kind of fixture. An inside frosted bulb with bowl silvered on the outside is used in the Graybar fixture. After one floor was completed it was found that it would be possible to use 150-watt bulbs in most spots with 200-watt bulbs wherever fine inspection was necessary. The average light thus obtained was better than 25 ft.-candles.



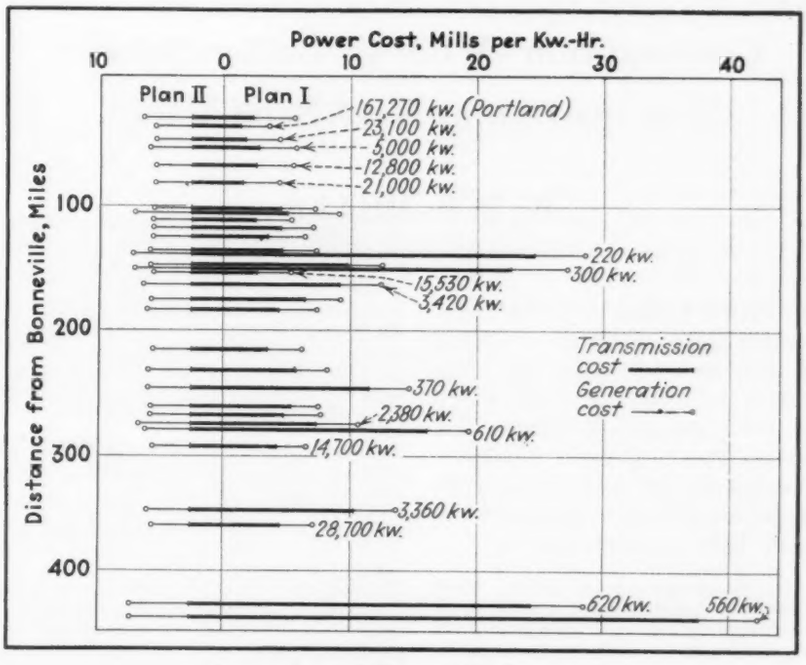
Before-and-after lighting in the Crosley factory

Bonneville Power Cost Study

Analysis of Minimum Cost of Federal Power Delivered at Receiving Substations, Based on Absorption of Output in Fifteen Years by 51 Substations

"ULTIMATE development (of Bonneville power project) will make available 390,000 kw. of dependable salable power capacity and approximately 2,500,000,000 kw.-hr. of salable energy per annum. This power will have to be marketed in an area now comparatively well served from existing private or public electric facilities and where the present per capita use is relatively large (almost twice the U. S. average). . . . Annual energy to be made available by the ultimate development at Bonneville is more than twice that generated in Oregon during the maximum year on record." Thus states the Advisory Committee on Power of the Oregon State Planning Board in discussing the marketing of Bonneville power in a report to Gov. C. H. Martin, in which the committee presents the first comprehensive study of wholesale cost of Bonneville power.

In making the estimate of costs a number of assumptions, given in the accompanying tabulation, have been necessary to form the basis for calculation. It is carefully stated in the report that the costs set forth "have no official standing" and represent the probable minimum at which power can be delivered without further federal subsidy. In fact, it is stated that "actual cost of substation deliveries will very likely be greater than set up."



Comparison of Bonneville power costs under proposed plan

A rate schedule was set up, as follows, which produces sufficient revenue to meet obligations imposed by the assumptions; these rates apply to generated power only, this power to be measured at the outgoing high-tension bus of the plant:

Demand charge—
$0.60 per kw. per mo.
Energy charge—
First 100,000 kw.-hr., 3.00 mills
Next 200,000 kw.-hr., 2.00 mills
Next 700,000 kw.-hr., 1.00 mill
Over 1,000,000 kw.-hr., 0.50 mill

Transmission line set up for the purpose of the study of transmission costs included some 1,900 miles of line which serve 51 receiving substations, 37 of which are in Oregon. All lines are of wood-pole construction except 100 miles of main line, where steel towers are contemplated. In estimating transmission cost it was assumed that load in the area to be served would be 2½ times the 1934 load, and that all the increase will be supplied from Bonneville. Transmission voltages vary from 110,000 to 33,000.

Two alternate methods of analyzing

[*Continued on page 122*]

Basic Assumptions for Estimating Cost of Bonneville Power

A. Installed capacity—432,000 kw.
B. All salable power to be distributed to 51 substations.
C. Salable power output to be totally absorbed in fifteen years.
D. Half the cost of dam fishways and reservoir—all cost of shiplock charged to navigation, balance to power.
E. Distribution of power to substations in proportion to present use in tributary area.

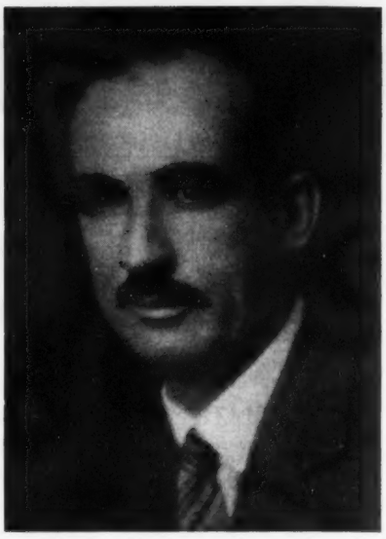
Generation Costs

1. Capital cost..... $46,000,000
2. Annual costs
   (a) Interest charges on capital at 4 per cent.
   (b) Amortization of capital cost over a period of 50 years.
   (c) Replacement fund to restore equipment made obsolete before 50-year period.
   (d) Maintenance and operation cost.
   (e) Carrying cost of unused facilities over fifteen-year load-absorbing period.

Transmission Costs

1. Capital cost..... $43,270,000
2. Annual costs
   (a) Interest charges on capital at 4 per cent.
   (b) Amortization of capital cost over period of 50 years.
   (c) Replacement fund to restore equipment made obsolete before 50 years.
   (d) Maintenance and operation cost.
   (e) No carrying charges for transmission system—it will be built in steps as needed.

"Better-Light" Sales, Load-Building Value



The Record of a Local Study of Increased Consumption Where "Better-Sight" Demonstrations Have Been Made

By B. E. MILLER
Wisconsin Power & Light Company, Madison

IN ORDER to determine the measurable value of domestic lighting work, a detailed analysis was made of activity in Janesville, Wis., a city of 21,000 population served by the Wisconsin Power & Light Company. In this analysis all customers were included who had been contacted by the domestic lighting representatives.

From this group were eliminated those customers who had purchased a major load-building appliance—range, refrigerator or ironer—during the period under consideration. There were also eliminated from the analysis those customers who had moved or for whom accurate data were not available in the same residence for a period of three months or more of 1934 and the corresponding months of 1933. The contacted customers were divided into two groups, namely, those who had the demonstration and added watts to their lighting load and those customers who had the demonstration but added no watts to their lighting load.

To ascertain what part of the increase in kilowatt-hour consumption of the customers contacted was due to causes other than the activities of the domestic lighting representatives, a check group of 363 customers—who had not been contacted—was analyzed.

From this check group, also, were eliminated those customers who had purchased major load-building appliances during the period considered and those for whom data were not available for three months or more in the same premises in 1933 and 1934.

In the analysis were included 272 customers who added to their lighting load and 235 who did not, making a total of 507 customers analyzed.

Data for individual customers were summarized into one of two groups, depending upon whether or not additional watts were used. The number of months were tabulated so that the final results represent weighted averages. The results from the three groups of customers are condensed into a final summary (see table).

From this table it is seen that for 272 customers, representing 1,416 customer-months, who were contacted and who added additional lighting load the monthly average prior to the demonstration was 77.6 kw.-hr. and the monthly average subsequent to the demonstration was 84.6 kw.-hr. For this group of customers the analysis shows an increase of 7 kw.-hr. per month per customer. The average added load was 178 watts per customer.

For the 235 customers, representing 1,333 customer-months, who received the demonstration but added no additional load, the monthly average prior to the demonstration was 60.6 kw.-hr., while for the months subsequent to the demonstration the average was 67 kw.-hr. This shows an increase of 6.4 kw.-hr. per customer per month.

For the two above groups, or 507 customers, representing 2,749 customer-months, who received the demonstration the analysis shows that an average of 95 watts per customer were added; that for the months prior to the demonstration the average was 69.4 kw.-hr. and for the months subsequent to the demonstration the average was 76.1 kw.-hr. This shows an increase of 6.7 kw.-hr. per customer per month for all customers receiving the demonstration.

For the comparable period of 1933 the average for the 363 customers who were not contacted and who did not receive the demonstration was 52 kw.-hr., while for the 1934 period the average was 55.8 kw.-hr. This shows an increase of 3.8 kw.-hr. per customer per month for those customers who did not receive the demonstration. These increases may, therefore, be considered as gravity business. Subtracting these increases from the increases realized by those customers contacted, we find that the group that added lighting load had a net increase of 3.8 kw.-hr. per customer per month and the group who added no watts had an increase of 3.6 kw.-hr. per customer per month. The increase for all contacted customers was 2.9 kw.-hr. per customer per month. It is felt that all of this increase may rightfully be credited to the domestic lighting activity.

Summary of Domestic Lighting Analysis in Janesville, Wis.

	No. of Customers	Customer Months	Added Kw. Per Customer	Per Customer Month 1933 Kw.-Hr.	Per Customer Month 1934 Kw.-Hr.	Increase 1934 over 1933 Kw.-Hr.	Increase over Check Group Kw.-Hr.	Annual Increase per Kw. Added
Contacted—watts added...	272	1,416	0.178	77.6	84.6	7.0	3.2	...
Contacted—no watts added	235	1,333	.....	60.6	67.0	6.4	3.6	...
Total contacted.....	507	2,749	0.095	69.4	76.1	6.7	2.9	366
Check Group.....	363	2,182	.....	52.0	55.8	3.8	...	Per kw.-hr

New May Records for Utilities

Revenue Rises 7.1 per Cent; Makes Best Gain in Years, but Is Little Above 1930 — Sales Up 15.3 per Cent

OPERATIONS of the electric light and power industry in May rose to a new high level for that time of the year with a revenue from ultimate consumers of $164,014,000 according to the Edison Electric Institute, and an energy output of 8,604,200,000 kw.-hr. The highest previous May revenue was $161,348,700, in 1930. The new figure surpassed this by 1.6 per cent and it surpassed last year's May by 7.1 per cent. The latter is the largest gain over a twelve-month period since the pre-depression days and marks another forward step in the widening margin of increase that has been in evidence for some time.

As in other recent months the output increased more than the revenue, the gain amounting to 14 per cent, or about the same as in April. In contrast with the very modest excess in revenue compared with the like month of 1930, energy production is now 14.7 per cent greater than it was six years ago.

Water power contributed 43 per cent of the total, but rose only 5.3 per cent, compared with May, 1935, thus throwing a much greater burden on fuel-burning plants, which increased their output by 21.2 per cent. This is not an isolated case of greater demands on thermal plants, for it is only a little above the corresponding average for the preceding four months, 19.3 per cent. Since December the water-power plants have not been supplying much more energy than they contributed a year ago; the rise in production is being carried mainly on steam.

Regional analysis shows pronounced improvement in revenue in the West; 13.5 per cent in the Mountain and 11.5 per cent in the Pacific states. The former reflects growing activity in the mining of metals, while the latter points to a continuation of the pick-up from rather low figures a year ago.

Industrial power still rising

In the distribution of output probably the most significant item is the increase of 18.8 per cent in sales to wholesale customers, representing chiefly industrial power. These sales rose for the third consecutive month and closely approached 4,000,000,000 kw.-hr., a figure exceeded only once in the history of the industry, by a small margin, in August, 1929. Domestic sales attained an all-time record for May, up 9.8 per cent from a year ago.

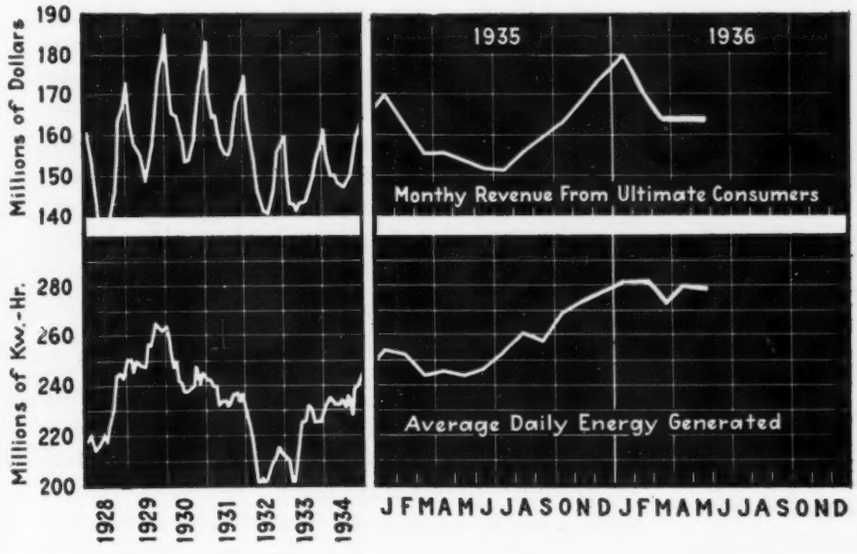


Table I—Monthly Revenue from Ultimate Consumers and Energy Output of Central Stations in the United States

Compared with Corresponding Month of Previous Year

Month 1936	Revenue from Ultimate Consumers†		Energy Generated, Millions of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent. Inc.
May	164,015	+7.1	8,604	+14.0	3,702	+ 5.3	4,902	+21.2
April	165,703	+6.2	8,422	+14.2	3,802	+11.0	4,620	+17.0
March	165,650	+6.3	8,434	+11.8	3,591	+ 5.7	4,843	+16.5
February	171,219	+5.4	8,120	+14.6	2,775	— 2.2	5,345	+26.9

Table II—Regional Revenue and Energy Output in May, 1936

Compared with Corresponding Month of Previous Year

Geographical Region	Revenue from Ult. Consumers		Energy Generated, Millions of Kw.-Hr.*					
			Total		Hydro		Fuel	
	Thousands of Dollars	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.	Gen.	Per Cent Inc.
United States	164,014	+ 7.1	8,604	+14.0	3,702	+ 5.3	4,902	+21.2
New England	13,789	+ 6.9	555	+ 8.0	309	+ 7.0	246	+ 9.0
Middle Atlantic	46,568	+ 3.2	2,087	+12.8	663	— 4.5	1,424	+23.2
East No. Central	37,820	+ 8.1	2,059	+15.0	249	+ 4.0	1,810	+16.7
West No. Central	13,779	+ 7.7	533	+ 2.9	168	—18.0	365	+17.1
South Atlantic / East So. Central	20,914	+ 8.8	1,079 / 374	+16.5 / +18.9	646 / 321	— 5.7 / +23.6	433 / 53	+77.2 / — 3.0
West So. Central	9,146	+ 7.5	423	+14.4	10	—73.0	413	+24.1
Mountain	5,024	+13.5	345	+23.5	289	+34.3	56	+14.1
Pacific	16,975	+11.5	1,149	+14.	1,047	+13.5	102	+32.0

*By courtesy of U. S. Geological Survey, with deductions for operations not regarded as central station.
†Preliminary, Edison Electric Institute.

Table III—Allocation of Energy May, 1936

Compared with Corresponding Month of Previous Year
(Edison Electric Institute)

Class of Service	Millions of Kw.-Hr.	Per Cent Inc.
Total for distribution*	8,532	+13.1
Lost in transmission, etc.	1,447	+ 3.4
Sold to ultimate consumers	7,085	+15.3
Domestic	1,165	+ 9.8
Com'l, small light and power	1,266	+15.2
Com'l, large light and power	3,975	+18.8
Municipal street lighting	180	+ 2.8
Railways—street, interurban	354	— 0.0
Railroads—electrified steam	77	+17.1
Municipal and miscellaneous	68	+50.2

*Generated, purchased from other sources, imported, less energy used in railway and other departments.

ELECTRICAL WORLD

L. W. W. MORROW · EDITOR

PUBLISHED EVERY SATURDAY BY
McGRAW-HILL PUBLISHING COMPANY, INC.

VOLUME 106 ESTABLISHED 1874 NUMBER 31

AUGUST 1, 1936

•

Let's Rub the Lamp

EVERY customer is a sales prospect for lighting. It is the least expensive business to sell and pays highest returns. It costs the customer less in investment and gives him greatest returns. The market is about 30 per cent saturated.

With these facts available, why has there been such inertia in the electrical industry in lighting sales—much talk and little action. We believe there are two reasons. One is the difficulty of selling lighting as a simple merchandising operation. The other and the greater is that the thunder in sales promotion has been dished out by the heavy-duty merchandisers. They have got the attention of the industry.

In a sense this is an indictment of the business ability of the lighting interests. But now they are awake and in action. They are developing ways and means to sell lighting. They are doing an admirable job of sales promotion. The record in this issue speaks for itself. It is evident that manufacturers, utilities, wholesalers and dealers are taking a fresh hold on lighting sales. Lighting is still the best business the industry can sell and serve. Let's see that a million I.E.S. units are sold in October. Let's see that an equal number of new kitchen lighting units are sold this fall. Let's back the new movement to sell lighting as a number one business project.

•

Those Darn Bushings

A FLASH, an explosion, a fire and a circuit interruption. That is the record of many an old high-voltage bushing on breakers and transformers. They are the weak links on power systems. This is no indictment of bushing manufacturers. They did the best job possible with the materials available and the latest bushings are greatly improved devices. But they still have to stand the life test in the field.

It is not easy to design a high-voltage bushing. The materials that must be used have limitations. The composite assembly represents a complex dielectric and mechanical arrangement. It is then placed in a service exposure that is enough to ruin most anything. Temperatures vary from below zero to more than 100. Rain, sleet, snow and wind-borne dust try their hand. An occasional flashover gets in its work. Finally, the bushing blows up and must be replaced, at an appreciable expense and usually with an interruption of service. No wonder operating and maintenance men swear at bushings, especially old bushings still in service.

What are the remedies? On existing installations it lies in careful and repetitive tests of bushings and quick relaying so that arc-overs do not hold on. It lies in the replacement of old bushings with new and better ones if one could only fix upon the life of bushings on a general basis. This can't be done, but bushings can be replaced in the light of information given by tests.

But a longer perspective indicates that research and development are needed. Perhaps other materials and other arrangements can be used. Perhaps even the latest designs of bushings can be improved. There is every incentive to the use of every possible research idea. Much has been done in recent years to improve bushings. But a visit among operators finds them still waiting the nerve-shattering explosion that tells of a bushing failure.

•

New England Utility Trends

BELOW the surface of routine operation, New England utilities are pressing upward in vigorous development. They share the rising trend of business with the rest of the industry, but in this concentrated populous and economic area the use of electricity grows apace, requiring administrative adjustments to new conditions. It is significant that sales activities are reaching new highs; that here and there additional generating capacity is going into place to meet oncoming loads, and that the long drought of equipment purchasing has at last been broken. In Vermont, the essence of Yankee-land, 90 per cent of this year's quota of electric refrigerators has been sold in six months, and in the industrial field electric furnace and welder sales have doubled those of a year ago. The all-electric home idea has taken root in the apartment hotel, and on a thousand fronts electrical conveniences are being sought by New England buyers for every class of service from garden floodlighting to store air conditioning. Electric motor sales run on from week to week in totals surprising in their diversity and distribution.

Despite the heavy burden of taxation rates continue to trend downward in terms of price per kilowatt-hour used. Political agitation seems to have collided with native common sense in recent legislative sessions, and "Quoddy" threats, never very real to the larger power market, appear to have subsided for the duration of the coma. Rural line extensions have been going steadily

ahead without political trumpeting. Interconnected operation of tidewater steam and interior hydro plants has become a fine art of engineering. Costs are being better controlled, as in refunding senior obligations and cutting down wasteful practices. System planning has been studiously pursued for future good on many properties and northeastern utilities are not likely to be caught napping by the rising tide of electrical demands. Corporate structures are being simplified and, perhaps best of all, both city and outside systems are putting more responsibility on local staff executives, working toward the easier and better understandings which have become so vital to public relations.

New England utilities serve old communities, but corporate individuality flourishes there, with resulting increased flexibility of performance and ability to meet the challenge of a far from electrically saturated region with intelligence and enthusiasm.

•

Research Undimmed

PRESIDENT CONANT'S championship of scientific research at the recent Harvard commencement will find wide acceptance in many business and engineering circles. "It has been suggested," said he, "that in these uncertain days the university should devote more of the time and energy of its staff to a consideration of the immediate social, political and economic problems which abound on all sides. We should use our resources, it is said, in attacking the immediate dangers which seem to threaten the existence of our civilization. Now I very much question this suggestion. I doubt the advisability of proceeding too hastily in this direction. The primary concern of the university today should be what it always has been, to foster the search for truth. . . . This is now recognized clearly among the wise leaders of industry in so far as the physical sciences are concerned. . . . If the academic chemists should turn their attention to the solution of the day-to-day difficulties of the manufacturer, the industry might profit but little and the progress of the science in this country would certainly cease."

No retreat of professors to an ivory tower is advocated by Dr. Conant, who supports the necessity of active contact with the problems of the world, but the primary aim is the advancement of knowlege, the development and clarification of principles and the intellectual discipline professed. "If they are successful," Harvard's head asserted, "they will have made lasting contributions to the philosophy of their subjects. Such contributions are surely of much more real value to civilization than would be the solution of immediate problems, however pressing such problems may appear. The knowledge which they gain, the point of view they develop may well outlast the troubles of more than one harassed and worried generation." Such notes rise clearly above the din of political turmoil and economic conflict to hearten those devoted to research basic in engineering progress, whether long deferred in material application or subject to rapid transformation into the technologies of daily life.

•

Railroad Electrification by Edict

THE Federal Power Commission says the railroads should electrify 5,429 miles of line at a cost of $600,000,000. This would certainly please the electrical industry ordinarily. But we assume that this should be done before November 4 and that the government will supply the power. Now that the poor farmers have been given the more abundant electric life on paper by the government it is high time succor be given the poor railroads.

Seriously speaking, however, many of the lines noted by the Federal Power Commission are prospects for electrification. Many of them have complete studies and plans already made. But we doubt the power of the government to order this electrification. It should come about as a legitimate economic feat of private enterprise. And despite the lack of credit of the railroads concerned and their losses in current operations it would seem wise for them to become active on more electrification at this time. The experience of the Pennsylvania between New York and Washington is a case in point. Railroad electrification is certain to come, with or without federal propaganda.

•

Proselyting May Break the Spell

IT ALL depends on where you are and how you look at matters. To the Southern voter T.V.A. is a shower of manna from on high in the form of cheap electricity. Before the Supreme Court T.V.A. is an agency for promoting navigation, soil preservation and national defense. But farther north it is being sensed as the basis of seductive blandishments to lure industry into the South with cheap power added to tax concessions as bait.

Officials of New England Council have had to warn industrial managements in their territory that certain solicitors have been quoting misleading power rates. The T.V.A. authorities have disclaimed this activity and admitted that the local promoters omitted the all-important demand charge from their citations.

In this instance, Congressman Smith became concerned about the industrial welfare of his Connecticut district. Maybe if a few more Congressmen from the upper belt of the temperate zone would think of their constituencies there would be less disposition to vote for colossal projects that can only exist and survive at the expense of the major tax-paying areas—taxed to build them and taxed to contribute the consuming load.

Who Will Get World Power Publicity?

GOVERNMENT ownership advocates are delighted at the prospect of going to bat with the electric industry at the World Power Conference to be held in Washington September 7-14. The crossfire of propaganda, incidentally, will lift the conference out of the dry essays and reports classification into which so many international conferences fall of their own ennui.

Both sides are seeking the widest possible publicity. Each is confident that the printed and spoken matter resulting will produce a public reaction in its favor.

Interesting in connection with this approaching battle is the rôle to be played by Morris L. Cooke, head of Rural Electrification. Cooke is not the bitter-ender for the government ownership and operation side that Harold L. Ickes, Interior Secretary and Public Works Administrator, is. Ickes has all the underlying venom against the privately owned public utilities and the resulting pure joy which results from merely thinking of a publicly owned plant putting a privately owned one out of business that is felt by President Roosevelt himself. Cooke is more interested in spreading the use of electricity—getting it down to the smaller chaps who have never used it—getting it installed for uses hitherto ignored or supplied in some less economical fashion.

Indeed, there would be no distress in the picture for Cooke if his activities should actually result in private utilities doing more business, providing rates were made low enough to obtain the maximum advancement in use of current. While it takes very little study of various utterances by Roosevelt and Ickes to see that such a prospect would not please them at all.

Important in this connection is the deep conviction of Morris Cooke with respect to what he likes to call "little waters." Here again he runs afoul of Ickes, and incidentally of the engineering industry. For Cooke has little use for Boulder Dams. What he likes to think about is the little dam in an 18-inch gully, which stops the runoff of rainwater, providing a little reservoir from which a small electric pump can pour the water back on the truck garden patch, or the orchard. This sort of thing, he opines, done all over the headwater country of the big river systems, would not only provide real flood control but would enormously increase agricultural production.

Nor is he thinking of the semi-arid West in this connection. Indeed, his favorite illustration of this sort of thing is laid in Michigan, a comparatively humid state, with normally plenty of rainfall. All of which explains his enormous interest in his chief job of furthering rural electrification if not his lamentable—from Ickes' standpoint—lack of interest in whether the electricity to run these little pumps is bought from a government power plant or from one owned by some economic royalists.

THERE is more than a little suspicion that the Federal Power Commission, in recommending electrification of some 12,000 miles of railroad trackage (total route mileage 5,529) had in mind providing an outlet for the various government electric plants, built, building or contemplated. Careful study of the report, however, indicates that this either had nothing to do with the details of the report, or that distressing stupidity played its part. Probably the former because of the three men who wrote the report, two were in active railroad electrification before, and the third had been in the electrical game.

The point is that the vast bulk of the projects recommended are in the East, where the government has no power plants even in contemplation, if one exempts the St. Lawrence seaway, unless one assumes that the Roosevelt policy of government electric plants should run riot when and if he is re-elected.

Two of the recommendations, Chesapeake & Ohio and Virginian Railway, might to some theorist knowing little of railroads seem a fair market for T.V.A. power. But the tie-up of those roads with the coal mines they serve is such that if and when they come to electrification they will almost certainly use power produced by coal. Even one of the Western projects, the Union Pacific, will always have a similar pull of influence from some of its good freight producers.

Incidentally, the St. Lawrence seaway seems as dead as Hector. For the first time since that project became a political issue neither political party mentioned it in its platform! The answer is simple, has nothing to do with electricity, or government ownership, or partisan politics. The Middle West and Northwest wanted that project to provide cheaper freight to Europe, thinking it would thereby raise the price of grain on Western farms and turn the Great Lakes cities into ocean ports. Crop curtailment and drought have combined to make this nation import food, which has taken a little steam out of the demand.

BUT more important, it has gradually become evident that the Atlantic and Gulf Coast states, fearing what the St. Lawrence seaway would do to their ports, and to the earnings of the railroads serving those ports, would always be able to have enough senators vote against the ratification of any treaty providing for it to prevent the obtaining of the necessary two-thirds majority.

Roosevelt, interested in the St. Lawrence primarily because of its power angle, though talking, in 1932, to the Middle West of the transportation angle, was badly beaten on his first fight for the treaty in the Senate, and has simply stopped talking in the last few months. The best evidence of which is that it is not mentioned in the White House-dominated Democratic platform.

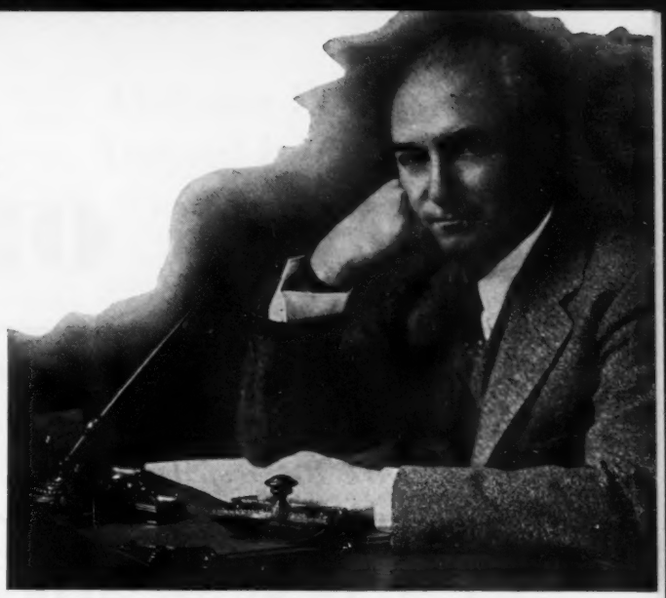
One would have thought that the port ambitions of Cleveland would at least have obtained a battle for a plank indorsing it at the Republican convention, but there was not a whisper.

Incidentally, it would be a cruel joke on the Boston & Maine, the New Haven and the New York Central if they proceeded with the recommended electrification, only to have a lot of their freight diverted to the St. Lawrence seaway. Not to mention the Pennsylvania and the Baltimore & Ohio.

Meantime there is a continuance of the slow movement of railroads to buy their current from private companies, instead of producing it themselves, New York Central being the latest convert.

—By CARTER FIELD

This noted journalist gives his personal comments and interpretations on current happenings affecting the electrical industry. His background and his location at Washington make his thoughts informative and interesting even though all may not agree with him.



Administration spokesmen have made much of the fact that in his acceptance speech Gov. Alf M. Landon did not mention public utilities, the electric industry, government ownership, or any kindred topics. But they will hear his views in plenty of time. Although there is no authority for any official statement, it is well known that Governor Landon holds some rather positive views about holding companies. He thinks they should be pretty thoroughly regulated. In fact, it would not surprise some of his friends if his remarks would be almost as displeasing to those favoring the consolidation of the electric industry gradually in a few hands as are the views of Franklin D. Roosevelt himself.

THE answer to all this is that Landon has been a little business man all his life, fighting some rather sizable competitors in the oil business. He has made good, but he has had plenty of battles and sometimes he has realized the crushing power of the big fellows. That is why he put that line about protecting the little fellow from monopolies in his acceptance speech.

But by the same token Landon does not favor the government plunging into business to compete with private initiative. His main idea of bringing about recovery is to induce the little fellow to take a chance, to go into business. And he means "little." Note that sentence about the ambitious workman who wants to become his own boss.

All this is why, coming from Landon, you can accept that statement about protecting the little fellow from monopolies, as well as from government harrying, oppressive taxation and direct competition, as meaning something. It is not just a political catchphrase. It is a lesson he has drawn from his personal experience, as other "little fellows" would view it, or an ingrown prejudice, as some of those favoring economy through bigness might size him up.

But it is there, and it is not going to change. Landon, it might be noted, has shown a stubborn resistance to change which has amazed many critics and commentators. So there is little doubt that when he delivers the speech which will deal with the electric industry there will be some in that industry who will be displeased.

Nor was the utterance of Landon with respect to labor unions as brave and fearless as has been painted by so many commentators. The plain fact is that Landon had nothing to lose. And everything to gain. And that he knew it.

This does not mean that it is a foregone conclusion that the so-called labor vote in this country will be cast solidly for Roosevelt. All that is definitely known is that the leaders of organized labor, no matter what may be their personal differences, though the feeling between some is very bitter indeed, are going to do their best to deliver every vote they can against Landon. John L. Lewis and William Green, and Green's backers who dictate what he does, are all working shoulder to shoulder for Roosevelt. And they *must* deliver on election day, no matter what happens in the meantime, or lose face as they have never done before in the history of organized labor. They simply are on the spot.

But that was true before Landon began drafting his acceptance speech. Nothing he could have said or left unsaid would affect their activity in the slightest. Nor that of their lieutenants in sympathy with their objectives.

LANDON'S plea here was to the "little fellow" in labor. The man who does not want to be ordered to strike, who wants to keep on working and provide comforts for his family and himself. The man who does not want his pay docked each week by a check-off for the benefit of union leaders.

What is really important is whether Green and Lewis and their associates can really deliver this time. They never have in the past. They have often made the claim, but they cannot cite a convincing case. When cross-examined, they like to point to the senatorial election in Ohio, in 1922, when Atlee Pomerene was defeated by Simeon D. Fess.

But let's look at the record. First, Ohio, is normally a heavily Republican state. Two years before it had gone for Harding by 401,985. Whereas, Fess, a popular Republican, only beat Pomerene by 50,601. Six years later Fess was re-elected by more than 500,000.

Then, on the Sunday preceding that "labor" victory, sermons were preached from the pulpits of every evangelical church in Ohio urging the election of Fess because Pomerene was "moist." This was at the height of the strength of the Anti-Saloon League. Two years before, with the big Harding versus Cox vote out, there had been a referendum. The Crabbe act, generally held as the most obnoxious search and seizure dry enforcement act of the period, had been approved by a majority of 250,000. So the drys may be excused for having been much amused at the claims of the labor leaders that it was Pomerene's labor record which beat him!

This time may be different. It may be that this time workers will follow their union leaders as they never have before, on the theory that Roosevelt policies are really in their interest. But it is certainly nothing which can be assumed in advance. Incidentally, *Literary Digest* polls of big industial areas will be highly interesting.

NEWS OF THE WEEK

T.V.A. to Swap Power With Industry . . . Utilities Contribute to Power Conference . . . Companies to Invest Millions in Rural Lines . . . Six-Year Construction Budgets Are Requested . . . Consolidated Edison Doubles Common Dividend

T.V.A. to Swap 20,000-Kw. Blocks of Incidental Power With Industry

Four-to-six-year contract is signed with Aluminum Company for "surplus power" from Norris Dam — Company to supply power for construction at Fowler Bend Dam on Hiwassee River

The Aluminum Company of America became the first contractor of industrial power generated at Norris Dam with the signing of a contract between the company and the Tennessee Valley Authority, it was announced at T.V.A. offices. The contract was executed as T.V.A. began first preliminary tests on the huge Norris generating units.

In addition to the purchase of industrial power, the contract provides that the company will supply power to T.V.A. for full construction requirements at Fowler Bend Dam, to be built by T.V.A. on the Hiwassee River. The authority will reimburse the company for construction power by supplying an equal amount of power transmitted from Norris Dam to Alcoa, where the Aluminum Company plant is located.

Two transmission lines will be required. A 154,000-volt line will be constructed between Norris Dam and the company's plant at Alcoa, near Maryville, Tenn. A second line will carry power from Santeetlah Dam, owned by the Aluminum Company, to Fowler Bend dam site. Both lines are to be constructed by T.V.A. and each will be about 35 miles in length.

Surplus power up to 20,000 kw.

The contract calls for the purchase by the Aluminum Company of Norris Dam power in blocks not to exceed 20,000 kw. demand. Terms of the agreement dispose of a class of power which municipalities and other public agencies could not use, it was explained, since it will be available only after all other requirements have been met. The contract describes this class of power as the authority's "surplus over navigation and flood-control requirements and other loads and commitments."

The rate for power purchased by the company is the regular T.V.A. rate for transmitted secondary power.

June 1, 1937, is given as the date for initial power delivery to the company. The contract will be in force for a period of four to six years, depending upon the construction time for Fowler Bend Dam. January 1, 1937, is given as the date for initial delivery of power to the authority at Fowler Bend.

•

Bar Association Hits at License System

A special committee of the American Bar Association announced this week that after a three-year study it was recommending drastic changes in the present prosecutor - judge - legislator tendency of the federal government and condemning improper delegation of license power to administrative and executive officials.

Citing N.I.R.A. and A.A.A. as examples where licensing powers were used to enforce statutes, the report states: "This, in essence, is tantamount to delegating power to determine what kind of punishment shall be inflicted for violation of the law or regulations, in addition to the penalties provided by Congress.

"To subject a business to a license system is to subject each individual engaged in that business to temporary or permanent loss of the right to continue in that business as a punishment for violation of the law or a regulation.

"There is no more drastic kind of punishment, and there is no system of regulation more acceptable to abuse and bureaucratic tyranny."

The committee's recommendations will be placed before the association August 24 when it convenes in Boston.

•

New I.E.S. Plan for Certified Lamps

The Illuminating Engineering Society announces that new agreements regarding certification of residential luminaires have been prepared for use between manufacturers and qualified laboratories.

Due to the practical difficulties encountered in drawing specifications for luminaires (other than table and floor lamps) I.E.S. has decided that the only workable plan is as follows: Representative samples are submitted to a qualified laboratory which acts as agent for the society; examinations and tests are made by the laboratory; a "jury of experts representing the society" passes upon the issuance of certificates of acceptance.

This procedure, the society says, is similar to that followed by the American Medical Association.

•

C.&S. to Sell Its Electric Plant at Springfield, Ill.

Central Illinois Light Company, a subsidiary of Commonwealth & Southern Corporation, will sell its electrical and heating properties in Springfield, Ill., to the city for $7,200,000, effective in September.

Springfield has been the scene of a municipal ownership controversy for more than twenty years, as the public utility company and a municipal plant sought to continue to exist side by side. Estimates indicate that savings of $270,000 per year will accrue from consolidation.

The city will tender $7,200,000 of new "electric revenue bonds" which depend solely upon earnings, rather than property.

Utilities Contribute to Power Conference

From the Washington Bureau of ELECTRICAL WORLD

Contributions amounting to $100,000 have been made to the Third World Power Conference by the private electric industry of the United States, says Floyd L. Carlisle, chairman of the board of the Consolidated Edison Company of New York and chairman of the finance committee of the conference.

This sum, combined with an appropriation of $75,000 voted by Congress, will be used to finance the conference, together with $75,000 from the Edison Electric Institute and $25,000 from the National Electrical Manufacturers Association.

Mr. Carlisle said: "This is the first World Power Conference to be held in this country and it offers an opportunity for us to reciprocate the hospitality which our foreign guests have extended to us on the occasion of similar meetings held abroad. I am sure that the exchange of ideas and information will be most helpful to the industry throughout the world."

Among those who have been active in work of the conference executive committee, which has met regularly in Washington, are: C. W. Appleton, vice-president General Electric Company; Gano Dunn, president J. G. White Engineering Company; Daniel C. Green, president Middle West Corporation; Frank D. Comerford, president, and I. E. Moultrop, consulting engineer Edison Electric Illuminating Company of Boston; William McClellan, president Potomac Electric Power Company; C. E. Stephens, vice-president Westinghouse Electric & Manufacturing Company, and Mr. Carlisle.

Other members of the executive committee include: Morris L. Cooke, Administrator Rural Electrification Administration, chairman; James C. Bonbright, trustee New York Power Authority; Robert H. Fernald, dean of the Towne Scientific School, University of Pennsylvania; A. C. Fieldner, chief engineer experiment Station Division, Bureau of Mines; David Lilienthal, director Tennessee Valley Authority; Frank R. McNinch, chairman Federal Power Commission; Major-Gen. Edward M. Markham, Chief of Engineers, U. S. Army; T. W. Norcross, chief engineer, Forest Service; Richard Southgate, Chief of Division of Protocol and Conferences, Department of State; O. C. Merrill, director of the Third World Power Conference, and Joel David Wolfsohn, executive secretary National Power Policy Committee.

•

47 Nations Expected at Power Conference

On Thursday Director O. C. Merrill announced that 47 nations have given definite assurances of their participation in the Third World Power Conference.

All of the major powers have accepted invitations to discuss "The National Power Economy." An acceptance from Australia results in representation from every continent. Fourteen nations in South and Central America are sending delegates.

Japan, China, India, Union of South Africa will be well represented also, and apparently the conference will be the largest international meeting ever held in the United States. Delegates will be present also from smaller nations in Central Europe—Luxembourg. Lithuania, The Netherlands, Latvia, etc. Africa's delegates are coming from South Africa and Algeria.

AS FAMOUS FIGURES PUT 110,000 KW. ON THE LINE

Wide World

New generating equipment valued at $4,600,000 goes on the line at Ford Motor Company as Edsel Ford (left) and Henry Ford start a new high-pressure turbo-generator

Alabama Power Denied Injunction

Alabama Power Company was denied an injunction to restrain the Cullman County Electric Membership Corporation, a T.V.A. co-operative group, from operating a distribution system. The injunction was denied by Judge W. W. Callahan, who held the Cullman corporation was valid under an act of the 1935 Legislature, which gives co-operative organizations the power to distribute electricity without a certificate from the Alabama Public Service Commission.

Alabama Power Company contended the co-operative was engaging in unfair competition because it paid no taxes, was not subject to regulations by the Public Service Commission and because the power company had been granted a franchise for the territory the co-operative proposes to serve.

•

Educate People on Quoddy Is President's Latest View

"I believe in Quoddy. Quoddy will be completed" said President Roosevelt Wednesday at Campobello to 400 friends and neighbors. Education will be necessary, according to the President, so that people in this country and in Canada may know the benefits that result from development of tidal power.

Possible joint arrangements for the development of the Quoddy site with Canada were said to be contemplated by the President this week.

•

Utilities Power & Light Sells English Holdings

Floyd B. Odlum, president of Atlas Corporation, on Wednesday sold holdings of Utilities Power & Light Corporation in the greater London and Counties Trust, Ltd., to Lazard Brothers for about $30,000,000.

The sale is considered of interest to the electrical industry for two reasons: (1) The increasing interest of British officialdom in repatriation of control of its electric utilities, and (2) Mr. Odlum's apparent willingness to relinquish his company's interest in these companies abroad.

•

Norris Dam Unit Goes on Test Run

One of the two 66,000-hp. generators at Norris Dam is now undergoing preliminary tests, although continuous operation of the units is not expected to start for some time. Present plans are to energize the line from Norris to Wilson Dam during the tests.

New Power Line for Tupelo, Miss.

"The use of electricity has grown so rapidly in this area that we are approaching a time when a heavier line will be absolutely necessary," Congressman John Rankin said last week at Tupelo. "The new 110,000-volt line which will soon be under construction will solve the problem."

Congressman Rankin said that the Tennessee Valley Authority has authorized the construction of a new 110,000-volt line to Tupelo. He added that the new line would provide power "for any heavy industries that might desire to locate in this area, not only in Tupelo, but for at least 100 miles around."

•

Carolina Group Asks Company Rural Line

Carolina Power & Light is ready to build rural electric lines in Robeson County, N. C., where an average of five customers to the mile can be obtained, Francis E. Coxe, manager of the Maxton office of the company, told a rural electrification conference in Lumberton.

A committee made up of representatives of various communities had been studying the situation in an effort to determine whether a co-operative should be formed and a loan obtained from the government for the erection of a line. Opinion was expressed that if the Carolina Power & Light Company would build the lines more satisfactory service could be obtained and they favored the power company's being given the right to erect the lines. Mr. Coxe said a preliminary survey made by the company showed 95 miles of line that would furnish 507 customers.

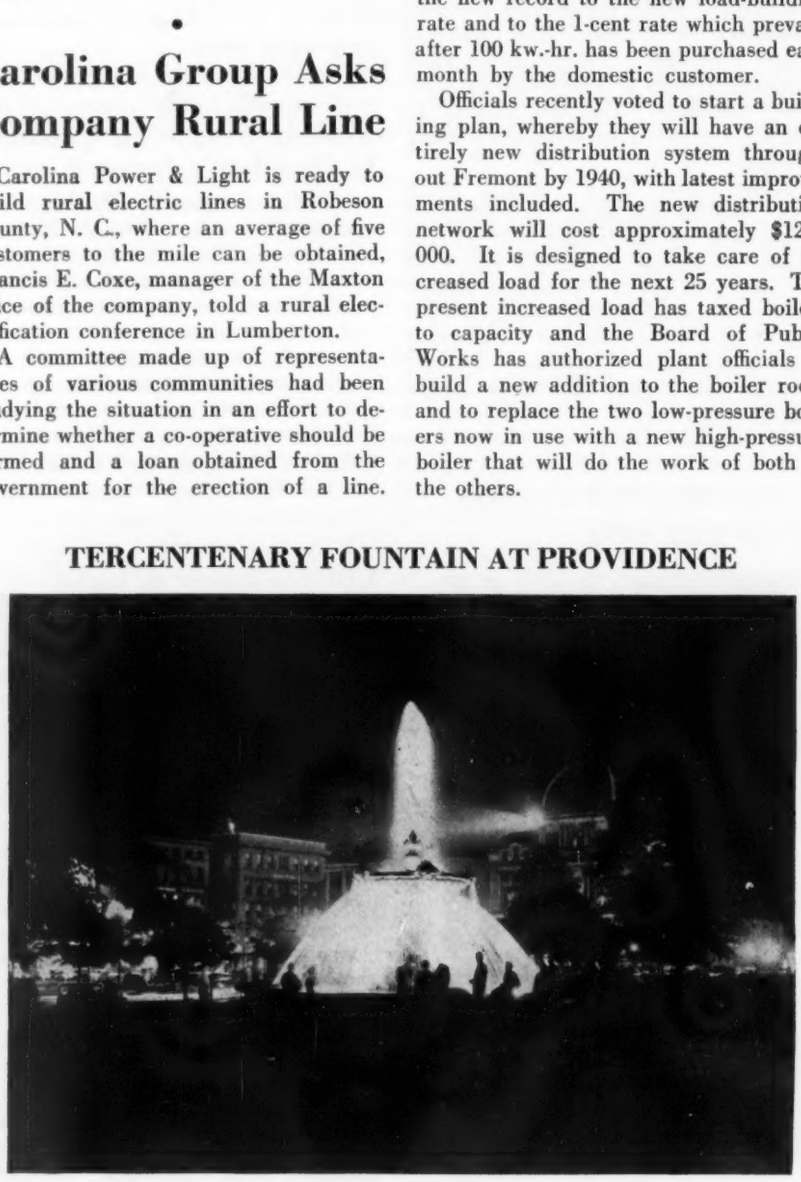
•

Fremont, Neb., Plant Plans Improvements

Delivering 41,300 kw. of electricity, the Fremont, Neb., City Water & Light Company recently broke all records for a single day's output. The total output this month will be far in excess of any previous July. Plant officials attribute the new record to the new load-building rate and to the 1-cent rate which prevails after 100 kw.-hr. has been purchased each month by the domestic customer.

Officials recently voted to start a building plan, whereby they will have an entirely new distribution system throughout Fremont by 1940, with latest improvements included. The new distribution network will cost approximately $120,000. It is designed to take care of increased load for the next 25 years. The present increased load has taxed boilers to capacity and the Board of Public Works has authorized plant officials to build a new addition to the boiler room and to replace the two low-pressure boilers now in use with a new high-pressure boiler that will do the work of both of the others.

TERCENTENARY FOUNTAIN AT PROVIDENCE



Red, green and blue are the hues of this illuminated fountain installed at City Hall Park in Providence by the Narragansett Electric Company as a part of Rhode Island's Tercentenary celebration. G.E.-designed, the fountain is illuminated by eighteen underwater-type floodlights; load is 23 kw.

Tennessee Project Now in Second Stage

With the closing of switches that turned Wilson Dam power into Jackson (Tenn.) substation last week the second stage of the West Tennessee urban and rural electrification project went into service with T.V.A. power from Wilson Dam, Earle R. Wall, T.V.A. project manager at Jackson, announced. Power is brought into West Tennessee from Muscle Shoals by way of Pickwick Landing Dam, through Jackson substation and sent over transmission lines to Milan, Bolivar and Somerville and to the Gibson County rural project. A total of 1,620 customers are now using T.V.A. electricity in the recently completed West Tennessee network. Completion of the next phase will bring the number of farm and city customers to 3,886 and put into service 597 miles of rural lines. This will include completion of West Tennessee Electric Membership Corporation lines in Madison, Haywood, Dyer and Obion counties. About $200,000 of electric domestic and farm equipment has been signed for by purchase agreement, a total of 2,412 items of major electric appliances.

•

Iowa Municipals Defeated

By a vote of 149 to 30, the town of Van Horne, Iowa, awarded a 25-year franchise to the Iowa Electric Light & Power Company on July 13. Also, the citizens of Perry, Iowa, firmly declined to abandon service from the same utility in favor of municipal ownership. The vote was 1,218 against the municipal plant and only 783 for it.

With just about enough "No's" to make the election legally unquestionable, the little town of Chelsea, Iowa, on July 15 voted 159 to 6 in favor of a new franchise to the Iowa Electric Light & Power Company.

•

Huge Army Dredge Planned

Fore River, Mass., plant of the Bethlehem Shipbuilding Corporation has been awarded a contract to build a dredge to cost $3,385,000 for use of United States army engineers. Steam turbo-electric drive and many electrical features will be included. The dredge, largest ever to be built for government service in this country, will be named the Goethals, in honor of the late builder of the Panama Canal. It will be 467 ft. long by 68 ft. wide and 36 ft. deep. It will give employment to 1,000 men for two years. Work will begin in something less than a month.

Companies to Invest Millions in Rural Electrification Program

Reports show more companies are undertaking extensive rural construction programs — Rural budgets for 1937 are higher

On the heels of the announcement last week (ELECTRICAL WORLD, July 25, page 5) that Georgia Power Company is doubling its 1936 rural construction program comes news that utility companies in Michigan, Texas, West Virginia, Arkansas and other representative locations are more alert than ever before to the rural electrification problem and its essential importance at this time.

The Michigan state public utilities commission has announced that electric power lines will be extended to 52,500 farmers in 1936 and 1937. The commission found that power companies will spend $5,800,000 in 1936 and $7,500,000 in 1937 to finance the extensions. They will add 23,000 farmer consumers in 1936 and 29,500 in 1937.

William M. Smith, commission chairman, said the Consumers Power Company will add 13,500 farmer consumers in 1936 at a cost of $3,500,000 and 20,000 in 1937 with an investment of $5,000,000.

The Detroit Edison Company is to extend lines to 5,500 in 1936 at a cost of $1,300,000 and spend a like sum in 1937 to extend service to a similar number of farmers.

About 30 smaller companies, the commission report said, would expend $1,000,000 to extend power to 4,000 farmers in 1936 and another million dollars in 1937 to bring power to another 4,000. The commission based its report on plans submitted by the various power companies.

Six hundred miles of new power lines and approximately 3,500 new customers are involved in a doubled rural electrification program now under way in the counties of Lapeer, Tuscola, Huron and Sanilac, according to E. L. Edwards, Lake Huron division manager of the Detroit Edison Company.

Under the program a wide area of farm and resort property will be given electrical service for the first time. When the project was first started, in January of this year, it called for but 350 miles of line, but applications for service were received in such large numbers it was necessary to increase the lines to 600 miles.

The system now servicing some sections of the four counties is also being overhauled for more effective transmission in addition to the extension service.

In West Virginia, the Appalachian Electric Power Company has completed the construction of a $10,000 extension from Princeton to Oakvale. This is part of the company's rural electrification program.

A five-year plan of expansion and electrification is now being planned by the Arkansas Power & Light Company with the announcement by Harvey C. Couch, president, to division managers to start surveys of state needs. The announcement was made at a meeting last week of the Employers' Mutual Benefit Association, consisting of division managers, chief clerks and officials. Mr. Couch discussed future plans with the division managers, although it was admitted that the plans are in the tentative stage.

In South Carolina the executive committee of the state rural electrification authority is negotiating with three utility companies to obtain a "satisfactory electric rate" for its proposed 500-mile system. The power companies opened litigation when the state Public Service Commission, co-operating with the authority, ordered them to supply power at a flat rate of 1 cent per kilowatt-hour. The electrification authority is now seeking to obtain the power without further litigation of the matter in the courts.

An immediate survey of possible electric power development at the Elephant Butte Dam and the sale of the power to farmers and others throughout the upper Rio Grande Valley of New Mexico and Texas was requested of the Rural Electrification Administration in a resolution recently adopted by the New Mexico State Farm Bureau, officials of the Elephant Butte Irrigation District and representatives of the United States Reclamation Bureau at a joint meeting held at Las Cruces, N. M.

"There are 150,000 persons in the area, forming the market for the 75,000,000 kw.-hr. of electricity that can be produced at the dam," L. E. Freudenthal, president of the New Mexico State Farm Board, said.

Congressman R. E. Thomason of El Paso said he will make every effort to obtain at least $2,000,000 in W.P.A. funds for early installation of hydro-electric equipment at Elephant Butte Dam. Mr. Thomason added that if efforts to get the P.W.A. money fail he will ask Congress for a direct appropriation.

•

Barriers Sought in "Hand-Picked" Case

Solicitor-General Reed last week filed the government's brief with the Supreme Court asking that legal barriers set aside by the District of Columbia Court of Appeals be restored in order that the constitutionality of the Holding Company Act of 1935 might first be tested in the government's "hand-picked" Electric Bond & Share Company case.

A number of utility companies are challenging the constitutionality of the Holding Company Act (ELECTRICAL WORLD, June 27, 1936, page 4), but stay orders were obtained by Attorney-General Homer S. Cummings in the District of Columbia Supreme Court. These orders delayed all legal tests except those arising in the Bond & Share case.

The North American Company was successful in having the stay orders dissolved so that it might proceed to a trial of its own case, upon the issues involved.

The latest move of the Solicitor-General is designed to sidetrack the North American Company and 48 other suits now pending until the Supreme Court passes upon the issues raised by the government in the Bond & Share case.

BIGGEST DITCH IS TO BE CLAY-LINED

Acme

This section of the 80-mile "All-American Canal" in southern California is being lined with clay. Thirty-six miles of this irrigation project is yet to be excavated

Regulation Features Utility Law Program

Timely discussions of regulation in various aspects will occupy the program of the section of public utility law of the American Bar Association at its forthcoming convention on August 25 and 26 at the Hotel Statler, Boston, under the chairmanship of George R. Grant, general attorney for the New England Telephone & Telegraph Company. Delegates will be welcomed by Chairman John J. Murray of the Massachusetts Department of Public Utilities at the opening session in the forenoon. This will be followed by a paper by Mr. Grant on "Legal Aspects of Government Regulation of Prices in Industry," by the standing committee report of Chairman Douglas Arant and an informal discussion.

Robert E. Healy of the Securities and Exchange Commission will open the afternoon session by a paper on "Title I of the Public Utility Act of 1935." Henry G. Wells, chairman, will then present a committee report on "The Relation of State and Federal Commissions under the Public Utility Act of 1935," after which Clyde L. Seavey of the Securities and Exchange Commission will present a paper on Title II of the act. The day's meeting will close with a general discussion of the act to be led by John W. Davis, Stephen S. Cushing, chairman of the Vermont Public Service Commission, Prof. Wesley A. Sturges of Yale Law School and K. F. Burgess.

Henry C. Attwill of the Massachusetts commission will read a paper on "Massachusetts Regulation of Public Utilities" on the morning of August 26, and the balance of the program will cover transportation problems.

•

Nebraska Power Transmission Built for Rural System

F. E. Smith, chief engineer for the Nebraska Power Company, has announced the company will construct with its own forces a new transmission line for rural electrification in the vicinity of Springfield and Washington, Neb., cost about $18,000; similar work in other parts of Colfax, Dodge and Washington counties, cost $35,000, and in Dodge County near North Bend and Rogers, cost $35,000. These projects are but a minor part of the company's entire construction program for the current year.

•

Taxes 59% of Payroll

Figures recently released by the National Association of Manufacturers show that public utility taxes last year were 59 per cent of total payrolls, $1,028 per employee, 16 per cent of sales, $1 per share of common stock, $451 per common-stock holder, and were equal to 90 per cent of dividends paid. The public utilities were second only to the oil industry in amount of taxes paid by industry.

•

6-Year Construction Budgets Asked by Government Bodies

Harold L. Ickes, chairman of National Resources Committee, on Wednesday asked 46 State Planning Boards to consider preparation of six-year construction budgets "to develop an integrated program of future public works."

Harry L. Hopkins, Works Progress Administrator, announced that he had requested "State Administrators of W.P.A. to co-operate with all State Planning Boards in the effort to keep up to date the inventory which constitutes a reservoir of work relief and public works projects supported by local and state governmental agencies."

•

Kansas Promotes Power Use

Kansas Corporation Commission sponsored a rural electrification conference at Topeka recently to study ways and means of promoting use of electric power on farms and in small communities.

COMING MEETINGS

Illuminating Engineering Society—Annual convention, Statler Hotel, Buffalo, N. Y., August 31-September 3. A. D. Cameron, general secretary, 29 West 39th Street, New York.

Third World Power Conference—Washington, D. C., September 7-12. Joel Wolfsohn, executive secretary, Interior Building, Washington, D. C.

International Association of Electrical Inspectors — Eastern section, Hotel New Yorker, New York, September 8-10; Northwestern section, Olympian Hotel, Olympia, Wash., September 14-16.

Pennsylvania Electric Association—Annual meeting, Bedford Springs Hotel, Bedford Springs, Pa., September 9-11. Harold A. Buch, secretary, Telegraph Building, Harrisburg, Pa.

National Electrical and Radio Exposition — Grand Central Palace, New York, N. Y., September 9-19. Ralph Neumuller, secretary, 480 Lexington Avenue, New York, N. Y.

West Virginia Public Utilities Association—Annual meeting, Greenbrier Hotel, White Sulphur Springs, W. Va., September 18-19.

Rocky Mountain Electrical Association—Annual convention, Santa Fe, N. M., September 21-23. George E. Lewis, managing director, Gas and Electric Building, Denver, Colo.

Association of Iron and Steel Engineers—Annual convention. Detroit, Mich., September 22-25. Brent Wiley, managing director, Empire Building, Pittsburgh, Pa.

Empire State Gas & Electric Association—Annual meeting, Saranac Inn, N. Y., October 1-2. C. H. B. Chapin, secretary, Grand Central Terminal, New York, N. Y.

National Electrical Manufacturers Association—Netherland Plaza Hotel, Cincinnati, Ohio, October 4-10. W. J. Donald, managing director, 155 E. 44th Street, New York.

Electrochemical Society—Fall meeting, Niagara Falls, Ontario, October 7-10. Colin G. Fink, secretary, Columbia University, New York, N. Y.

Another Scramble for Rural Areas

In South Carolina a power company and a public agency are contending before the state Public Service Commission for the right to build a rural power line into Troy, in Greenwood County. Spokesmen for a delegation of fifteen Troy citizens said the town of 200 preferred the service of the South Carolina Power Company of Charleston because its line would be erected sooner and would handle a large volume of electricity.

Representative J. M. Cox of Greenwood County, speaking for the group, said there was nothing certain about the plans of the Greenwood finance board, sponsor of the Buzzards Roost power project, to construct a 111-mile county system. Dan T. Duncan, representing the finance board, said the public project would supply electricity at a rate one-third lower throughout than the power firm's.

James F. Crist, commercial agent of the South Carolina Power Company, told the commission: "We built about 160 miles of rural lines in the past two years, and we are building more steadily, because the people have become rural electrification minded and times are better."

The commission took the question of authorizing construction under advisement, after testimony given revealed it would take 60 days to build the public line and only 21 to build the company line.

•

Consolidated Edison Will Double Radio Time

On September 13 the Consolidated Edison Company will return its series "Echoes of New York Town" to the air for a full hour Sundays, 6 to 7 p.m. over NBC station WJZ. The series was last heard from September 29, 1935, to June 21, 1936, for a half hour every Sunday —6:30 to 7 p.m.—over NBC station WEAF.

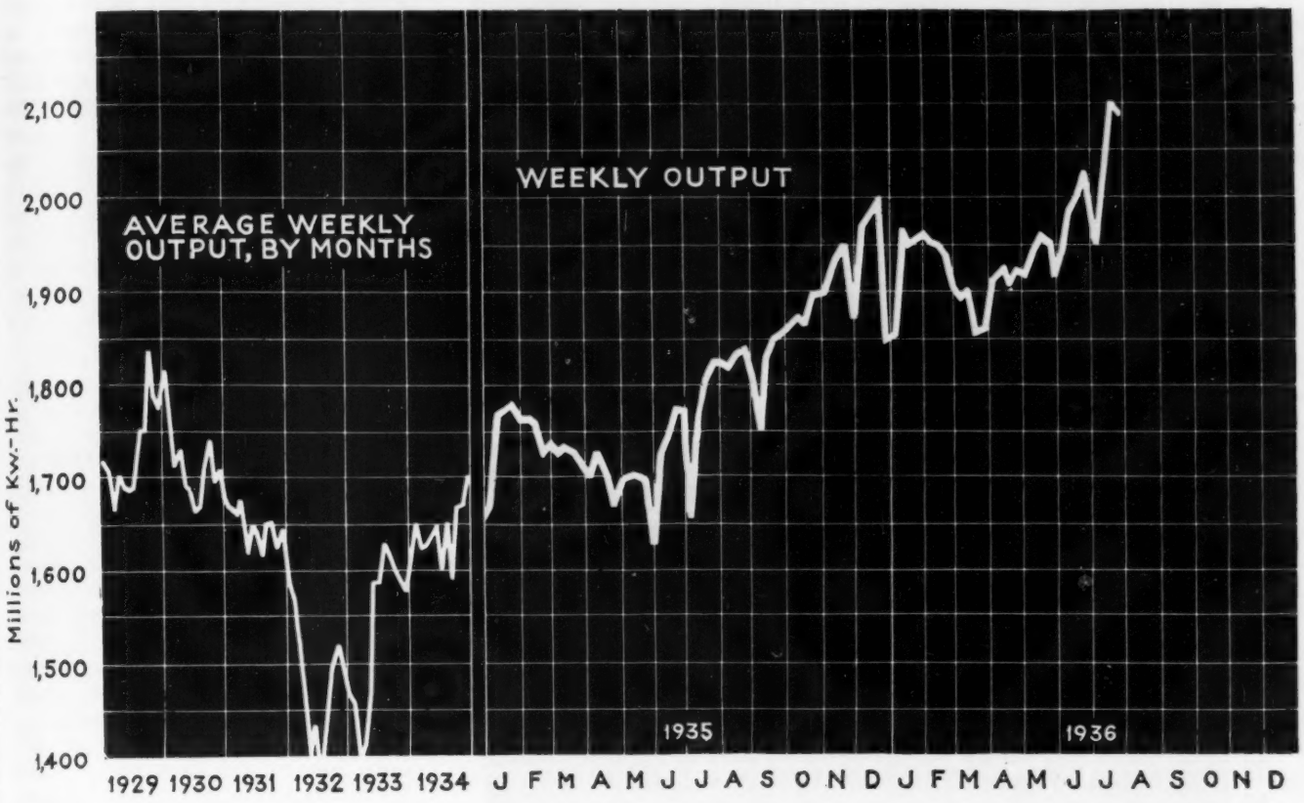
•

Puget Sound Seeks More Rural Business

S. P. MacFadden, vice-president Puget Sound Power & Light Company, has inaugurated a new advertising program to increase its farm business. Rather than publish rate schedules or "average" rates for rural use, the company has selected local farms and listed the uses of electric service on these farms and now advertises the farms with their typical service bills.

The company's average unit rate for rural service with a monthly usage of 500 kw.-hr. is 1.80 cents per kilowatt-hour.

Output Holds Record Breaking Gains



Although output of electric light and power plants for the week ended July 25, totaling 2,088,284,000 kw.-hr., showed a slight recession from the all-time high of 2,099,712,000 kw.-hr. for the week ended July 18, these figures of the Edison Electric Institute show that recent record-breaking gains are being held, even during the summer months of a Presidential year, when recessions habitually occur.

The output figure for the week of July 25 is 14.5 per cent above the same week last year, 4.3 per cent above the winter peak of last December (which was equaled last month) and 21.2 per cent above 1929.

Slight increases in the percentage gain in output over last year are to be noted this week for the New England and the Rocky Mountain areas. Minor decreases occurred in the other regions.

Weekly Output, Millions of Kw. Hr.

1936		1935		1934	
July 25	2,088	July 27	1,824	July 28	1,684
July 18	2,100	July 20	1,807	July 21	1,664
July 11	2,030	July 13	1,766	July 14	1,648
July 4	1,956	July 6	1,655	July 7	1,556
June 27	2,030	June 29	1,772	June 30	1,688
June 20	2,005	June 22	1,775	June 23	1,675

Per Cent Change from Previous Year

	Week July 25	Week[1] July 18
New England	+12.2	+10.6
Middle Atlantic	+ 9.7	+11.2
Central Industrial	+18.2	+21.4
West Central	+15.7	+16.7
Southern States	+17.4	+18.8
Rocky Mountain	+19.2	+17.5
Pacific Coast	+12.6	+ 8.9
United States	+14.5	+16.2

Central Illinois to Push Sales

Central Illinois Public Service Company recently added its first semi-annual conference of sales representatives to its usual program of one meeting a year. The meeting, held at Springfield, attracted some 250 sales representatives and a number of manufacturers' representatives. A business session was held at the Hotel Abraham Lincoln in the afternoon, with a musical, speechmaking dinner served there at 6.30.

James F. Orr, vice-president, who is in charge of sales, acted as conference chairman. L. A. Magraw, president; E. F. Kelly, vice-president in charge of operations; Mr. Olsen, sponsor for the company in the Midwest organization; Edwin Bernard, in charge of rates, Midwest Corporation, and M. R. Rogers, manager of merchandise sales, all took an active part in the program.

A banner above the speaker's table announced "Our Job" as being to "Build profitable load at reasonable cost at a satisfactory pace using methods which improve trade relations with other utilities." It also established an aim of 500 kw.-hr. and 500 cents per customer.

•

Fine Rural Job by Wisconsin Companies

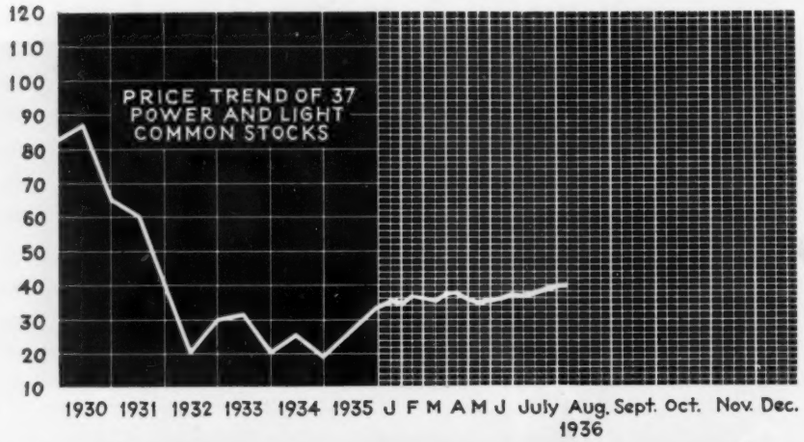
Privately owned utilities operating in Wisconsin built more miles of rural lines in the state during the first six months of 1936 than they have in any year since 1929, a survey by the Wisconsin Utilities Association reveals.

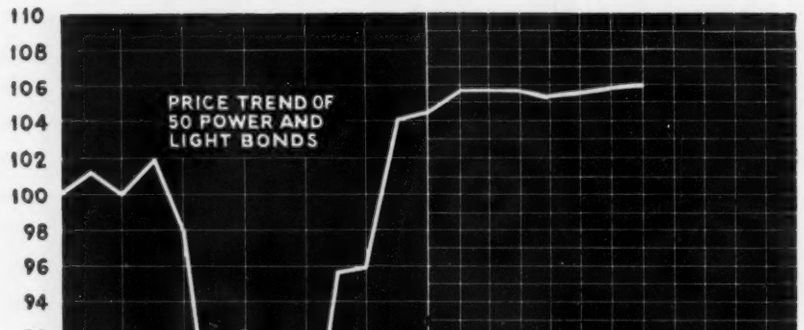
The companies have built, have in construction or have contracted for 1,135 miles of extensions to rural lines so far this year. In addition, another 380 miles of line are to be contracted for before the end of the year, according to present plans.

When the 1,135 miles of line are finished the companies will be serving 3,632 new rural customers and, if the additional 380 miles are built, the total number of rural customers will be increased by 4,848, according to estimates of the association that the lines average 3.2 customers to the mile.

The privately owned utilities have about 12,000 miles of rural lines in Wisconsin and now serve some 42,000 rural customers.

Utility Bonds Advance; Stocks Gain





Prices of electric light and power bonds pushed upward in July. "Electrical World" index, 106.1; June 105.9. Stocks advanced sufficiently during the past week to carry the "Electrical World" index up to 40.0, compared with 39.5 the preceding week.

S.E.C. Grants Two Applications

Arizona Edison Company has applied to S.E.C. for exemption from the provisions of the Public Utility Holding Company Act of 1935, under Section 3 (a) (2) of the act. Exemption was granted.

Middle West Corporation, a registered holding company, has applied, pursuant to Section 10 (a) (1) of the Public Utility Holding Company Act of 1935, for approval of the acquisition of 9,000 shares of $3 cumulative preferred stock, without par value, of Copper District Power Company, one of its subsidiaries. Approval was granted.

S.E.C. has set August 10 as the date for hearings on the application of the Public Service Company of New Hampshire for exemption of its proposed offering of $1,000,000 of first mortgage bonds, due 1961, bearing interest at not more than 4 per cent, and of 5,400 shares of preferred stock, $5 dividend series, from the provisions of Section 6a of the Public Utility Act.

•

Consolidated Doubles Common Dividend

Directors of the Consolidated Edison Company of New York at a meeting held on Monday declared a dividend of 50 cents a share on the common stock, against 25 cents a share paid in the five preceding quarters. The rate had been 50 cents quarterly, having been reduced from 75 cents quarterly in June, 1934.

The disbursement was not designated a "quarterly" dividend and therefore cannot be construed as establishing a $2 annual rate. The quarterly earnings statement showed a consolidated net income of $33,225,951 after all deductions, equal, after $151,880 of minority interests and $10,496,245 for preferred dividends, to $1.97 each on 11,476,527 no-par common shares for the twelve months ended on June 30, compared with $34,818,603, or $2.10 a share, in the preceding year. For the June quarter net income was $8,849,038, equal after estimated minority interest and preferred dividends to 54 cents a share on the common stock, comparing with $8,186,873, or about 48 cents a common share, in the June quarter last year.

•

Utilities Announce More Refunding

New York Edison Company recently offered $30,000,000 first lien and refunding mortgage 3¼ per cent bonds dated April 1, 1936, and due April 1, 1966. The bonds are priced at 102 and accrued interest, to yield approximately 3.14 per cent to the period at which they can be called for redemption at par. Proceeds from the sale, together with funds from current cash, will be applied to the redemption on October 1, at 105, of $30,000,000 6½ per cent first lien and refunding mortgage bonds, series A, now outstanding and nominally due in 1941.

Tennessee Electric Power Company has asked authority to issue $4,782,500 additional principal amount of its 5 per cent first and refunding mortgage bonds to reimburse the treasury for capital expenditures and to retire underlying bonds in the sinking fund. These bonds will not be offered to the public, but will be taken up by Commonwealth & Southern, the parent company, because that is the best market. The Tennessee utility has $15,530,500 principal amount of this series outstanding, and the company feels that if the threat of T.V.A. were not ever present the issue could be refunded into one bearing a lower interest rate.

Ohio Public Utilities Commission recently approved the $35,000,000 refunding program of the Cincinnati Gas & Electric Company. The company plans to issue $35,000,000 of 3¼ per cent first mortgage bonds, proceeds to be used to retire a like amount of 4 per cent first mortgage old bonds due April 1, 1968. The new bonds will be due in 1965.

•

T.V.A. Enters Trenton

The T.V.A. has opened an office in Trenton, Tenn., where it is seeking members for a power co-operative.

MANUFACTURING AND MARKETS

Orders Up 80% in First Half

Allis-Chalmers Manufacturing Company reports for the six months ended June 30, 1936, a net income of $2,088,600, or $1.55 a share, on 1,347,736 no-par shares of common stock outstanding, after charges including debenture interest, depreciation and normal federal income taxes, but before provision for federal surtaxes on undistributed income, if any, as same cannot yet be determined. This compares with net income of $554,954, or 41 cents a share, in the first six months of 1935. Billings for the first half of 1936 were $27,399,052, compared with $16,370,416 in the corresponding period of last year, an increase of 67 per cent.

Orders booked in the first half of the current year amounted to $30,664,836, an increase of $13,638,729, or 80 per cent, over the $17,026,106 bookings in the first half of 1935. Unfilled orders on June 30, 1936, totaled $10,776,376, compared with $8,669,549 on June 30, 1935, an increase of $2,106,827, or 24 per cent.

Net income for the quarter ended June 30, 1936, was $1,334,473, or 99 cents a share, compared with $577,196, or 43 cents a share, in the second quarter of 1935. Billings in the June quarter this year were $15,765,884, an increase of $6,093,114, or 62 per cent, over billings of $9,672,770 in the corresponding quarter last year.

•

British Electrical Factories Boom

The British electrical equipment industry is now receiving substantially larger orders than twelve months ago and, if the present prosperity continues, 1936 is likely to prove an even better year than 1935, which was one of the best ever experienced by the industry. Most of the big electrical equipment enterprises are now working at peak capacity and several of them have been forced to enlarge plants to enable them to cope with the growth of orders.

If the rate of progress now being made by the electrical trades in the United Kingdom continues, it is probable that in the not far distant future the financial world may see developments whereby some of the smaller companies will be merged. Already reliable reports are current that new working agreements may shortly be concluded between certain important undertakings in the industry. The stocks of electrical manufacturing concerns are rising steadily.

•

New Kitchen Booklet by N.E.M.A. and E.E.I.

National Kitchen Modernizing Bureau of the Edison Electric Institute is offering a colorful 16-page booklet and two pictorial folders for inclosure with monthly statements. The offer is made conditionally at present, R. E. Barnes, manager, states, as production will depend upon the orders received.

Sponsored by the institute and by the National Electrical Manufacturing Association, the 16-page booklet of practical modern kitchens mentions no brand names.

Anaconda Wire Net Income Totals $632,148

Preliminary report of the Anaconda Wire & Cable Company for three months ended June 30 shows net income after expenses, depreciation, obsolescence and provision for federal normal income taxes of $632,148, equal to $1.50 each on 421,981 capital shares, compared with $251,869, or 60 cents a share, in the similar period last year.

•

Cutler-Hammer Reports Tripled Net Profit

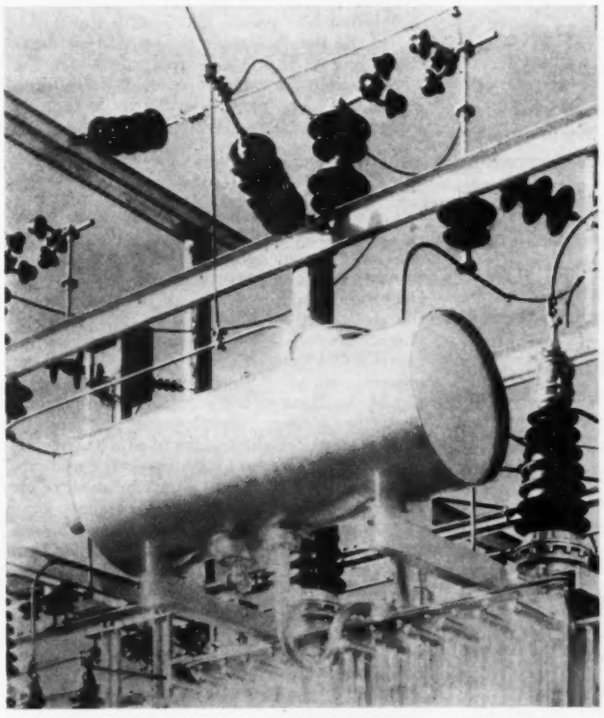
For the six months ended June 30 Cutler-Hammer, Inc., reports net profit after depreciation and other charges, but before federal surtaxes on undistributed income, of $573,794, equal to $1.73 each on 329,999 shares, compared with $221,438, or 67 cents each on 329,600 shares, in the first half of 1935.

•

Rome Cable Corporation Starts Operations

Rome Cable Corporation, Rome, N. Y., organized last January with a capital of $1,000,000, to manufacture bare and insulated copper wire and cable for heavy and light electrical service, has begun operations at its new local plant, with employment of about 125 men. A new rolling mill is being completed and will be placed in service at an early date, when the working force will be increased. A large production schedule has been arranged. The new company is headed by former officials of the Rome Wire Company, merged several years ago with the General Cable Corporation, New York, including Herbert T. Dyett, C. A. Scott and H. W. Barnard, all of Rome. Arrangements have been made for sale of a block of common stock totaling about $741,000, fund to be used for plant operations and development of business, it is reported.

EXPERIMENTAL INSTALLATION OF CONTROL GAP



Recently announced 69-kw. control gap of Ohio Brass Company has been in service on the Fan Hill substation of the Metropolitan (Los Angeles) Water District since 1933

Refrigerator Sales Total $107,019,161

For the first six months of 1936 sales of household refrigerators in this country amounted to 1,311,820 units, valued at $107,019,161, compared with 1,005,981 units, worth $77,353,148, for the first half of 1935. World sales for the first six months of 1936 totaled 1,410,893 units, costing $114,257,950, against 1,071,754 units valued at $82,452,696, in the corresponding period last year.

According to the announcement made by the National Electrical Manufacturers Association in June 216,008 units, worth $17,323,013, were sold in this country, against 146,988 units, valued at $11,159,075, in June, 1935.

•

Westinghouse Expending $750,000 at Mansfield Plant

Westinghouse Electric & Manufacturing Company has begun an expansion program at its branch plant at Mansfield, Ohio, to include a new five-story building, totaling about 300,000 sq.ft. of floor space, and three additional floors on an existing structure, 80 x 193 ft. General contract recently was let to the Rust Engineering Company, Pittsburgh. Entire expansion will cost about $750,000. Prack & Prack, Martin Building, Pittsburgh, are architects.

•

Company Formed to Make Electric Heat Regulators

Increased sales activities and broadening of the policies of the Tritrol Regulator Division of Jas. P. Marsh Corporation have led to the formation of a new company to take over the sales, engineering and servicing phases of the Tritrol System of Heat Regulation.

The new organization will be known as the Marsh Tritrol Company and its officers are C. H. Olmsted, president,, and H. T. Kucera, vice-president. C. H. Bevington, who has been identified with Tritrol sales as Chicago representative, will be sales manager of the new organization, which is located at 720 North Michigan Avenue, Chicago.

New York Metal Prices

	July 22, 1936 Cents per Pound	July 29, 1936 Cents per Pound
Copper electrolytic	9.75*	9.75*
Lead, Am. S. & R. price	4.60	4.60
Antimony	11.375	11.375
Nickel ingot	35.00	35.00
Zinc spot	5.175	5.175
Tin Straits	43.75	42.50
Aluminum, 99 per cent.	19—21	19—21

*Delivered Connecticut Valley.

Field Reports on Business

Reports to ELECTRICAL WORLD *from the field indicate that business can't be bothered with politics and isn't very much worried about drought disrupting the happy outlook. News from almost all lines shows that recent high levels have been maintained, while optimism for the rest of the year is spreading. Even the steel industry, which feared a slump in August, now believes the dip will be very small.*

PACIFIC COAST

Carloads of pins, insulators, poles and pole line hardware for utilities and the government forest service feature a fortnight of heavy buying. Wholesalers report a probable slight decrease in business over June, largely due to sales vacations early in the month. House wiring material predominates in volume, with the Northwest doing a proportionately better job.

Prices on wall and flexible steel conduit have risen about 5 per cent; certain staple switches, outlets and outlet plates have sharply dropped down in price 20 to 30 per cent. An occasional shortage of such a staple or some major appliance such as a refrigerator is occurring for the first time since 1930, barring a few steel items after the Pittsburgh flood of last winter. Skilled labor is still at a premium with some trading back and forth between high-pressure and low-pressure areas.

A remarkable feature of California business is the rising importance of hitherto isolated or comparatively backward areas which are now reporting unprecedented purchases of wiring material and appliances. This is largely caused by remote industrial plants, concerned with mining or chemicals, or in some cases by power extensions to fruit valleys.

Other prevailing fields for excellent business are postoffices, topped by San Francisco, now locating site for $5,000,000 structure; Salinas, with $500,000, and Flagstaff, Ariz. Berkeley reports $1,000,000 of school work, Sacramento $1,250,000 with P.W.A. assistance, and San Francisco a new Junior College.

Aviation business is active with the building of the Pan-American base near San Francisco, and a $1,000,000 repair dock for the army base at Sacramento opened for bidding in August. The peninsula district is topping the state for sustained building increase.

CHICAGO

The awaited seasonal slump has apparently failed to materialize as business activity spurted forward again last week. The midsummer outlook was the best in years as the strong demand for nearly all products forced the steel mills to increased output. The exceptional increase of electrical energy output for the Chicago area was reason for further encouragement. Wholesalers and retailers report an unexpectedly rapid pace in merchandise turnover. Employment and payrolls show a more definite upturn in this district.

Utility purchases of heavy equipment are steadily increasing; one company reports orders running approximately 85 per cent ahead of last year. A manufacturer of large household appliances reports a gain of 56 per cent in sales over 1935 for the first six months. The demand for smaller appliances remains steady. R.E.A. projects in the southern part of the state have resulted in a greater demand for line equipment. Thousands of feet of cable were used to replace that damaged in the flood of the Union Station and Post Office. The bursting of a huge water main completely engulfed two large generating plants and disabled all electric, telephone and switching apparatus, necessitating the immediate repair and replacement of $250,000 worth of equipment.

NEW YORK

Higher earnings from almost all lines of business—including most public utility companies—are being translated into fatter dividends for many stockholders. And this, in turn, builds further the backlog of purchasing power which underlies the present optimism of business.

Nothing has happened this week to turn the curve down from recent high volume in industry and trade. In fact, optimism seems to grow day by day. Conspicuous is the steel industry, where predictions now are again revised upward—August, instead of showing a fairly sharp seasonal drop (magnified because July didn't slump) may sustain current activity because of good orders which continue to pour in. Be that as it may, current operations hold just below the year's high.

The construction industry has turned in a good six months, even though residential building did fall a little short of the rosiest expectations. Enough home building has been and is being done to inspire high hopes for electric appliance and fixture manufacturers as well as suppliers of home furnishings. And electric energy output, though sagging a little last week, was just below the previous week's all-time high. The margin over a year ago, nevertheless, was pared to 14.5 per cent.

NEW ENGLAND

Sustained demand for electrical supplies and equipment, with volumes much in excess of last year, features the New England market. In the marine field some excellent business is developing and five submarines will soon be built at Portsmouth, N. H., and New London, Conn., with electrical material representing close to $2,000,000 in value. The Fore River yard of the Bethlehem corporation will build a turbo-driven dredge for the U. S. Engineers with extensive electrical equipment at a total cost of over $3,300,000. Both propulsion and dredging apparatus will be motorized. In the utility field a hydro-electric unit will be installed near Rutland, Vt., and another water-power unit has been bought for the Scotland Dam plant of the Connecticut Light & Power Company.

Large generating business for utilities still lags, with a few exceptions lately noted, but at the rate loads are growing and manufacturing facilities and personnel are developing more serious consideration of future load requirements will soon be in order.

Power transformer deliveries are already lengthening and distribution transformer business is very active. Modernization and replacement of such apparatus as a result of lightning storms are drawing heavily on factory stocks. Meter sales are far ahead of a year ago and only part of this is due to floods. Cable sales are rather quiet, but transmission line construction in runs of a few miles is active here and there. Industrial control and motor business is vigorously active, running about 40 per cent above last year's level.

Regulating transformers are moving spiritedly and the Cape & Vineyard company has just purchased two automatic load ratio control units aggregating about $30,000 in value for use at Buzzards Bay and Hyannis, Mass.

Eastman Johnson's "The Boy Lincoln"

Everybody Wants To See Better

PEOPLE generally are showing positive signs of abandoning contentment with twilight illumination. Even when things were pretty dismal folks mysteriously used enough more kilowatt-hours to break output records. A large slice went for better light to see by.

The disposition is there. What it needs is a cosmic urge, a bit more momentum. The Better Light-Better Sight program is the foundation for that moving force. It has already gripped, and with unified support at the consumers' end of the channel the pace can be greatly accelerated.

There is no question about the magnitude of the uncultivated market. This is set forth in the statistical display which follows. In ten years the utilities can develop $120,000,000 additional revenue from lighting consumption alone. Half a billion dollars roughly represents what would meanwhile be spent for lighting equipment and wiring to serve it adequately.

Is it safe to speak of a ten-year build-up? Positively, because Better Light-Better Sight is a continuing activity and no casual flash in the pan. The Illuminating Engineering Society program is conceived in terms of the whole home; there is a parallel activity for industrial and commercial elevation of standards and accomplishment. Highway hazards have impressed themselves to the point where light is recognized as the criterion for 60 per cent of the accidents. The waiting 50,000 miles of inky arteries will not be lighted in a year, but at least that much can be lighted within ten.

The creators and producers in the industry have provided the wherewithal in engineered and modernized equipment geared to adequate seeing. The utility industry here and there has organized the selling methods to make the program roll forward. A few good cases are presented here. The object of this whole presentation is to make those who hold the pursestrings see that they can greatly accelerate a nation-wide effort which will give America a fair chance to see what it has been missing.

Foundation Laid for Decade of Lighting Sales

Professional, Social, Official, Commercial, and Educational Groups Now Teamed to Capitalize the Growing Acceptance of Sight Saving, Life Saving, Dollar Saving

Selling electric cooking, electric refrigeration, electric warming or electric cleaning are at least tangible tasks. Cooking is merely cooking, and so are the others simple. But lighting is a matter of trying to induce all indoors and some of outdoors to simulate sunlight. The problem is so diffuse and so much more fraught with humanity, psychology and physiology that it is no wonder that only feeble progress has been made. And until the matter of conserving eyesight promised to take rank alongside conserving fuel and forests and animal life and soil it looked as though lamp makers and kilowatt-hour makers would have to go it alone.

WHAT makes the promotion of light so hopeful is that it has enlisted the aid of dozens of social, professional, political and educational interests for which no counterpart whatever exists in other efforts to induce patronage of the electrical industry. Just name for yourself even a few agencies lending aid in the selling of electric cookery, or cleaning or refrigeration comparable in number and unselfish interest to those now actively urging Better Light for the sake of Better Sight and longer life. Here are just a few:

Illuminating Engineering Society.
American Optical Association.
American Automobile Association.
Local school boards.
Parent-Teachers Association.
Eyesight Conservation League.
American Legion.
State bar associations.
Motor vehicle commissioners.
etc., etc.

With such support and encouragement it should be evident that the Better Light-Better Sight campaign is no transitory or upstart affair. It is endowed with continuity and has already acquired the momentum that presages permanence. Any factor, especially the utility factor, that budgets outlay on a year-to-year basis, expecting that the Science of Seeing slogan of Luckiesh and Moss is likely to go into a penumbra of desuetude, is guessing wrong. The eyesight specialists are not going to drop it, the mothers of school children will not drop it, the paint companies will not drop it, the automotive authorities will not drop it and, of course, the manufacturers of lighting tools will not drop it. Nor can the power business allow its humanitarian and economic function to sag or even be spasmodic. It is charitable to attribute such hesitancy as there has been to the very diffusiveness of the problem, so let's see what there is to be capitalized upon and emphasized.

Home lighting can be placed upon a permanent schedule because with the best of promotional activity the replacement and additions will take years to catch up with the abysmal obsoleteness of present lighting in the home. The certification program of the Illuminating Engineering Society has made a phenomenal start with the amazing volume of study and reading lamps already introduced into the homes of America. But the program does not and will not stop there. It has already moved into an even more harmoniously acceptable form of end-table reading lamp (April 30, 1936) and to a scientifically designed portable lamp. At the E.E.I. convention in St. Louis it was announced that there would be a drive in October for a goal of 1,000,000 of these portables in that single month. To back it up there is to be an $85,000 advertising drive by the Better Light-Better Sight Bureau.

Nor does it stop there. It has just been announced, so that it is permissible to say here that I.E.S. will extend its activities of standardization all over the home. Technical approval will be given to residence luminaires to insure eye protection and effective seeing, but with maximum freedom left to the producer to exercise ingenuity in artistic design. Samples will be submitted by manufacturers to a designated laboratory which will make the photometric and mechanical tests of conformity. An impartial qualified I.E.S. jury will make a "blind" study of the lamps in operation. Those which meet with the jury's standards of performance and artistry will be recommended for the certification of acceptance of the Illuminating Engineering Society. That gives dealers to sell and utilities to promote a quality product for every spot in the home. For the early future is some comparable procedure in connection with electrical fixtures for the home.

Parallel to this activity there are I.E.S. and companion moves in connection with schools, highways, public buildings, industrial plants, commercial establishments, recreation fields. Thus in the industrial field the excessive obsolescence now so prevalent in lighting will be confronted with standards of appropriate lighting for the particular process functions of specific industries. The information for the printing industry has already been released; shoe manufacturing, weaving,

R.L.M. STANDARDS INSTITUTE INCORPORATES TO PROMOTE QUALITY IN INDUSTRIAL-COMMERCIAL LIGHTING

Objects

1. To promote and encourage high standards of quality in the design, construction, composition, finish, performance and service of lighting equipment, lighting fixtures and pertinent accessories thereto.

2. To make, or cause to be made, and to supervise tests, investigations, experiments and inspections in connection with the manufacture and marketing of lighting equipment, lighting fixtures and pertinent accessories thereto.

3. To formulate, administer and disseminate specifications of standards in design, construction, composition, finish, performance and service of lighting equipment, lighting fixtures and pertinent accessories thereto, and to secure compliance with such specifications on the part of members of the R.L.M. Standards Institute, and others.

4. To issue, or cause to be issued, and to supervise the publication or issuance of bulletins, circulars, certificates, labels and other printed matter in order properly to inform the public and all others using, specifying, installing or distributing lighting equipment, lighting fixtures and pertinent accessories thereto about such tests, investigations, experiments and inspections.

5. To promote and encourage in the public mind by publicity and other methods a keener interest in the advantages to be found in the use of modern lighting equipment manufactured to scientific standards not only for the proper protection and conservation of the eyesight, but also as a factor in the importance of preventing accidents in industrial plants and elsewhere.

6. In the furtherance of these objects to promote friendly and intelligent co-operation among its members and other associations, organizations and institutions interested in the same or similar objects.

Charter Members

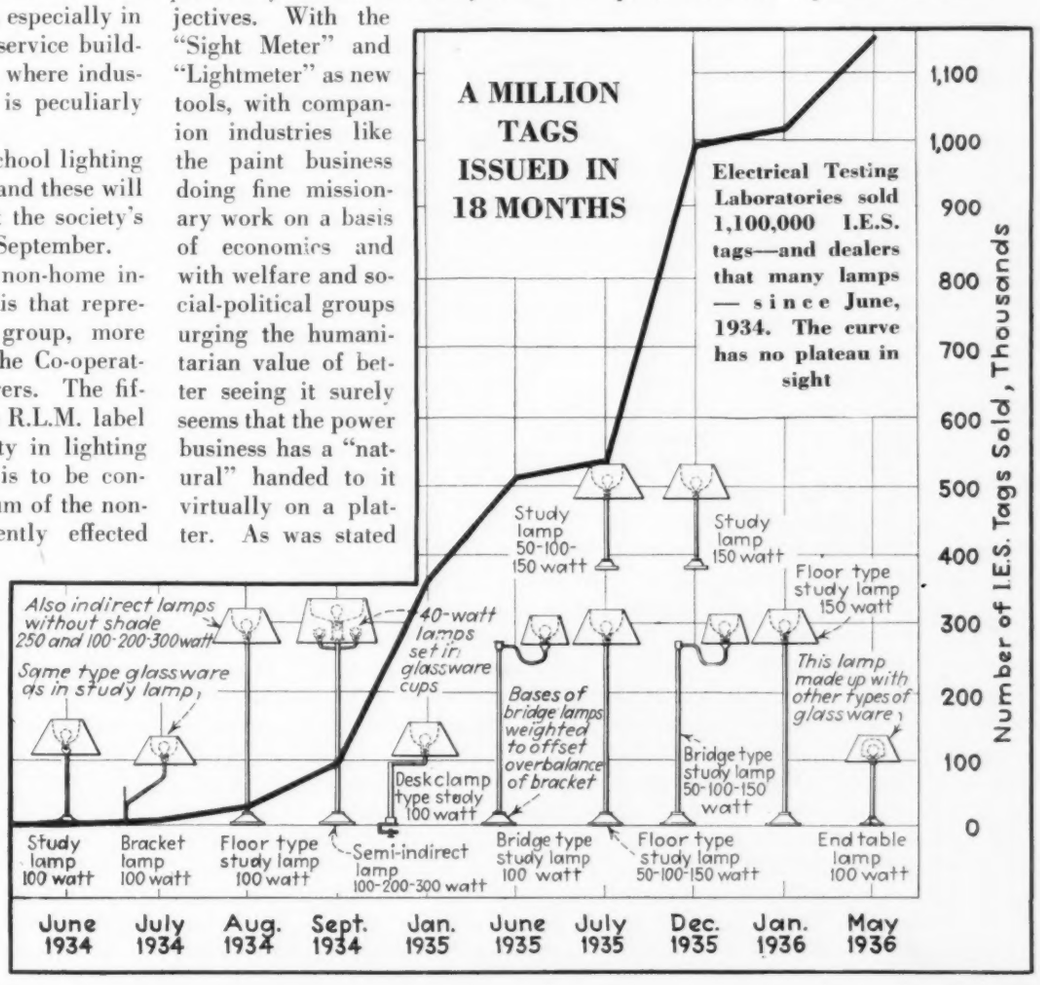
Abolite Reflector, Benjamin, Goodrich, Miller (Ivanhoe Division), Overbagh & Ayres, Quadrangle, Westinghouse, Wheeler Reflector.

metal fabricating, tool manufacturing, textile mills are among industries for which authoritative data will be prepared by the I.E.S. committee. These summaries will provide a sound technical basis for intelligent promotion in a field which is rapidly expanding. Naturally the benefits will reach over into the commercial field, especially in warehouses, stockrooms, service buildings and drafting rooms, where industrial lighting equipment is peculiarly adaptable.

Revised standards of school lighting are in progress by I.E.S. and these will probably be presented at the society's convention in Buffalo in September.

Another phase of the non-home interior lighting situation is that represented by the R.L.M. group, more recently functioning as the Co-operating Reflector Manufacturers. The fifteen-year standing of the R.L.M. label as the insignia of quality in lighting and lighting equipment is to be continued through the medium of the non-profit organization recently effected under the name R.L.M. Standards Institute. In addition to the features enumerated in the accompanying panel, it is the intention to have the organization render a definite contribution not only to the wider use of the well-known R.L.M. dome and its modifications and companion devices, but also to aid in the wider acceptance of a tailor-made job for the special needs of industrial and commercial applications of lighting.

Here, then, are specific fields of lighting activity in which the electrical industry has the enthusiastic support and independent interest of groups not previously affiliated with any of its objectives. With the "Sight Meter" and "Lightmeter" as new tools, with companion industries like the paint business doing fine missionary work on a basis of economics and with welfare and social-political groups urging the humanitarian value of better seeing it surely seems that the power business has a "natural" handed to it virtually on a platter. As was stated in the first sentence, not even food preservation enlisted the multitude of diversified welfare groups now pressing for better light in all its ramifications. The situation presents a rare opportunity to cultivate a public appreciation of utility service where appreciation betters public relations.


A MILLION TAGS ISSUED IN 18 MONTHS
Electrical Testing Laboratories sold 1,100,000 I.E.S. tags—and dealers that many lamps — since June, 1934. The curve has no plateau in sight
Number of I.E.S. Tags Sold, Thousands
1,100
1,000
900
800
700
600
500
400
300
200
100
0
Also indirect lamps without shade 250 and 100-200-300 watt
Same type glassware as in study lamp
40-watt lamps set in glassware cups
Study lamp 50-100-150 watt
Study lamp 150 watt
Floor type study lamp 150 watt
This lamp made up with other types of glassware
Bases of bridge lamps weighted to offset overbalance of bracket
Desk clamp type study 100 watt
Bridge type study lamp 50-100-150 watt
Study lamp 100 watt
Bracket lamp 100 watt
Floor type study lamp 100 watt
Semi-indirect lamp 100-200-300 watt
Bridge type study lamp 100 watt
Floor type study lamp 50-100-150 watt
End table lamp 100 watt
June 1934
July 1934
Aug. 1934
Sept. 1934
Jan. 1935
June 1935
July 1935
Dec. 1935
Jan. 1936
May 1936

Light Averts More Than

Nation Aroused—States Beginning to View Light as Indispensable Adjunct of Four-Lane Smoothness in Facilitating Highway Flow With Safety

WHEN J. C. Furnas published "—and Sudden Death" in *Reader's Digest* he did not exactly start something, but he did give a cause a remarkable impetus. He focussed public opinion on a waste and a tragedy which utilities and light creators had known for long, but were too timid to do much about. Now, seeing for safety is becoming a national urge and the excuses for reticence are fading. True, there are factors which still deter utilities from engaging wholeheartedly in the program for illuminated highways, but this article will fail of its purpose if it does not scotch a few more of the obstacles.

Why should there be lukewarmness on the part of the power industry when:

Newspapers are campaigning for safety,
Governors and mayors write and proclaim the need,
National conferences are co-ordinating the programs,
Automobile associations and manufacturers are pressing the issue,
Legislators are urging bills to authorize lighting of highways,
Lighting manufacturers have provided the tools and paved the approaches to the market?

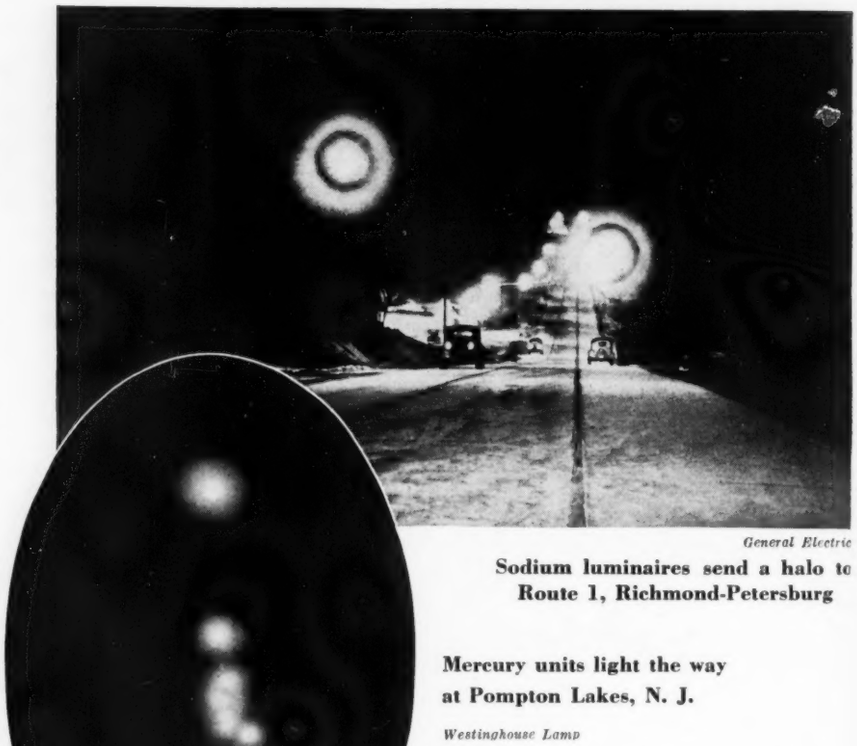
This movement is reaching a crest, and unless highway lighting is made, now, a positive component of all these programs, it may be extremely difficult to incorporate it later. Meanwhile, public outlays will have been committed to other and possibly less meritorious contributions to safe travel.

More than half the nation's 37,000 deaths of 1935 occurred at night. In the congested districts the proportion is much higher, and *it is increasing*, even though the *day fatality trend is downward*. (See the chart of the Connecticut Department of Motor Vehicles.)

What the power industry has been hesitant to capitalize is the fact that the accidents are reduced 35 to 40 per cent on stretches that have had modern traffic lighting applied. The negative proof is found in the fact that night accidents went up 144 per cent on the Mount Vernon Memorial Highway after discontinuing the lighting. Nevertheless, these facts are well known to those who are promoting safety. Inspecting cars, examining and educating drivers, placing more signs, installing grade separations are commendable, but inadequate lighting remains as the prime source of the hazards at night. Proper light is the quickest and surest contribution to a halving of the slaughter.

Those who know say there are 50,000 miles of highway on which lighting could justify itself as a clever investment paying an annual return of 333 per cent, and at a cost per mile only 5 to 6 per cent of the cost of building the highways. As other states pick up the movement already under way in New York, Connecticut, New Jersey and Ohio, the acceptance of highway lighting as a logical outlay of public funds is sure to spread. It is sure to be found that the cost of operating such lighting installations will be only $600 to $1,000 per mile, whereas the fatalities per mile are now entailing a national economic loss of some $6,000 per mile from the present volume of preventable night-time accidents on the main traffic arteries.

How will this movement be furthered, and where do the utilities find a duty and an opportunity to participate? There is, of course, no necessity for stressing the load-building aspects. They are recognized. It is the social-economic phases which now need culti-



General Electric

Sodium luminaires send a halo to Route 1, Richmond-Petersburg

Mercury units light the way at Pompton Lakes, N. J.

Westinghouse Lamp

Two in Five Night Deaths

By
ARCHER E. KNOWLTON
Associate Editor

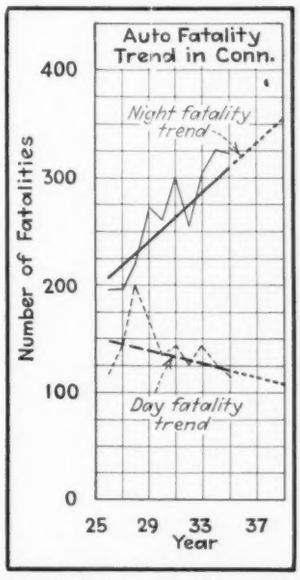
vation. Let's round up what is going on and then infer where the power company fits into that picture.

The American Road Builders Association has instituted a five-year national program of safety which will actively exploit highway lighting as a positive remedial measure. The lighting industry is one of twenty participating sponsors. Travelers and Metropolitan are big insurance companies energetically preaching highway lighting, as are other casualty and life companies. The National Safety Council will co-operate. The American Legion will soon launch a safety campaign with light a prominent advocacy. Of course, motor-vehicle administrators will become more and more enthusiastic boosters. The state bar associations have been incorporating recommendations in their reports.

These are just a few of the agencies which are awake to the essentiality of light for the driver—cheaper and better and safer light than that from the searchlights he carries with him. They are approaching the problem from the sociological angle, just as service to the farmer is being approached. The latter movement is in full swing and the former will not be denied either. Therefore, it behooves the utilities to tie up with the movements before it introduces irrevocably any of the adverse elements which they may have been contemplating with wonted awe.

It is likely that many of the installations will have to be installed at utility expense. Few states have yet set up the legal authority for the outlays. Most of them will ultimately do so. Few more are likely to be facilitated by the lighting manufacturers—they are carrying the promotional load in other ways. Therefore, the utilities must expect the program to require their capital contributions to get the initial demonstration stretches installed. Admittedly, the annual bill will be high if it has to carry the capital charges as well as energy and servicing. That will only help to advance the idea that the states can get the light and safety for annual outlays commensurate with what they are spending for road upkeep, signs, fences, etc.

One of the first things to do is to ferret out the best location for a demonstration stretch. It should be straight or else it should be an underpass, a traffic circle, or a hazardous intersection where results can be persuasive. The traffic density should probably be upward of 2,000 cars for a twelve-hour daylight count. These criteria are the foundation for an estimate that there are 50,000 miles of highway that demand illumination.



Light would check rising slope of night fatalities everywhere

See duplication of this ominous trend in New York, Massachusetts and California in ELECTRICAL WORLD of July 4, 1936.

Incidentally, the Illuminating Engineering Society has just set new standards of lamp lumens, spacing and height for all widths of pavement of either dark or bright color. Those figures are the recognized criteria for proper intensities and distribution.

Now assume that all the engineering and negotiations have functioned into an installation of which the officials and the utility can rightly be proud. There is nothing more important to the furtherance of lighting the highways than to publicize and dramatize these initial installations in effective manner. There should usually be a dinner, to which will be invited all those who have had a hand and those who can influence other permanent installations —state, county and city officials, and heads of automobile clubs, chambers of commerce, safety councils. After appropriate addresses, the group should be taken to the installation by buses in which are guides who will lose no opportunity to keep the message before the party, even en route. That is the place to emphasize the vis-

[*Continued on page 62*]

Lighting Store

Forty-eight 750-watt semi-indirect units replaced as many 200-watt glass-inclosing globes in Ivey's department store, Charlotte, N. C.

New Tools to Use—

SELLING lighting successfully, like selling anything else, is to a considerable extent a matter of securing the confidence of the customer. Confidence in the recommendations of the lighting specialist is the criterion which often means either the acceptance or rejection of his recommendations.

One of the first principles of building confidence is to keep the interests of the customer uppermost. Our lighting specialists are instructed to make only those recommendations which will accrue to the customer's best interest. Thus, if lighting conditions are found in which changes would mean a reduction of kilowatt-hour consumption, the facts are truthfully pointed out accordingly. In several instances we have been able to make savings for our customers by reducing the connected load in old obsolete lamps by replacing them with the new and more efficient lamps. In other instances the wattage may not have been decreased, but more illumination produced for the same or very slight increase in wattage. For example, in a store at Spartanburg our lighting specialist recommended a new type of fixture using one 300-watt lamp to replace a fixture having several small bulbs totaling no more in wattage. Since large lamps are more efficient and permit better utilization of light by the fixtures, this change resulted in raising the illumination from 5 to 15 ft.-candles, three times the illumination without any increase in wattage.

Such service is extremely valuable, for it has been the experience that after the customer secures better lighting he quickly realizes the advantages over the poor lighting, with the result that he uses it over a longer period of hours.

Authoritative sources of information help to substantiate recommendations made by lighting specialists when the customer has a feeling that an excessive number of outlets or too-high-wattage lamps are recommended. For example, the I.E.S. standards of school lighting have been particularly useful when working with architects and school officials. Similarly, the booklets issued each year by the Illuminating Engineering Society on Light in Architecture and Decoration, consisting of examples of outstanding installations incorporating lighting effects as well as illumination results, have been used effectively to sell lighting ideas both to laymen and to architects. The I.E.S. Lighting Data Sheets are also used to advantage. Architects are regularly supplied with them and individual sheets are used to illustrate specific types of installations. These sheets show an illustration of the installation, the lighting layout, lamp sizes, foot-candle result and a description of the physical features of the job.

These publications of the Illuminating Engineering Society together with the various papers on different lighting subjects published in the *Transactions* are utilized constantly to tell the story of better lighting and seeing and to impress our customers with the fact that our recommendations are on a par

Aug. W. Smith department store, Spartanburg, N. C., before and after relighting

Below—Glare and annoying reflections besides low illumination level prevailed before relighting. Opposite—An increase of 2½ times the original wattage produced three times as much illumination with a marked improvement in the quality of the lighting.

By
ROY A. PALMER
Illuminating Engineer
Duke Power Company,
Charlotte, N. C.

and Factory

Totally indirect lighting in the Chipman-LaCrosse hosiery mill at Hendersonville, N. C., exceeds the power load in kilowatts connected

Where a multiplicity of shadows would otherwise exist in the knitting room, indirect lighting is quite ideal for providing excellent quality illumination. Footcandles, 25.

Examples of Results

with present-day practice everywhere.

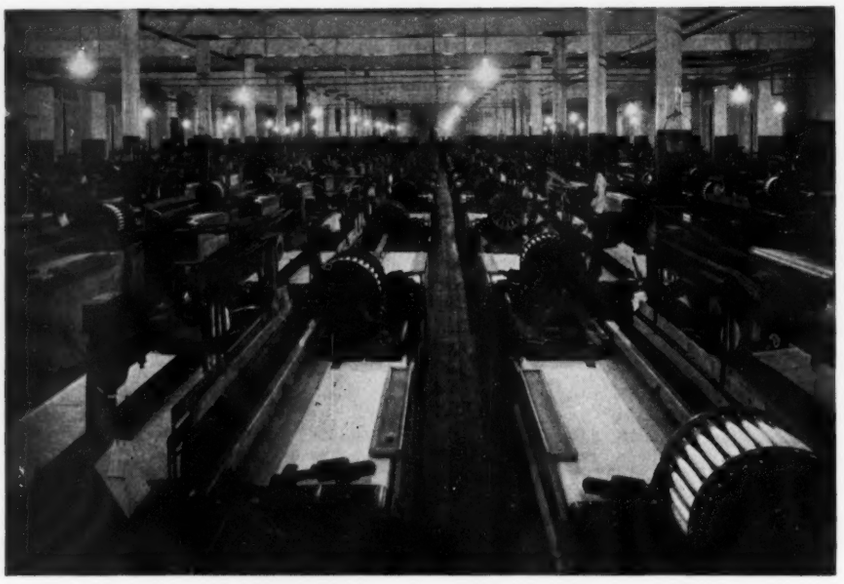
While these outside data are used to advantage, local outstanding lighting installations are also utilized to help sell new jobs. In several issues of the *Duke Power Magazine* short, concise items are used to describe recently installed lighting systems which measure up to high standards. Lighting prospects learn of the various stores, filling stations, industrial plants and others in the Piedmont Carolinas which have recently installed good lighting. The large number of installations which are using 500-, 750- and 1,000-watt lamps, as well as combination high-intensity, mercury-vapor, incandescent lamp units consuming 1,200 watts in each, are indicative of the fact that these firms are finding it economical to use those high-wattage installations to produce comfortable seeing-levels of illumination on the order of 25 to 50 ft.-candles. This often serves to break down resistance to the acceptance of our recommendations involving high-wattage lamps.

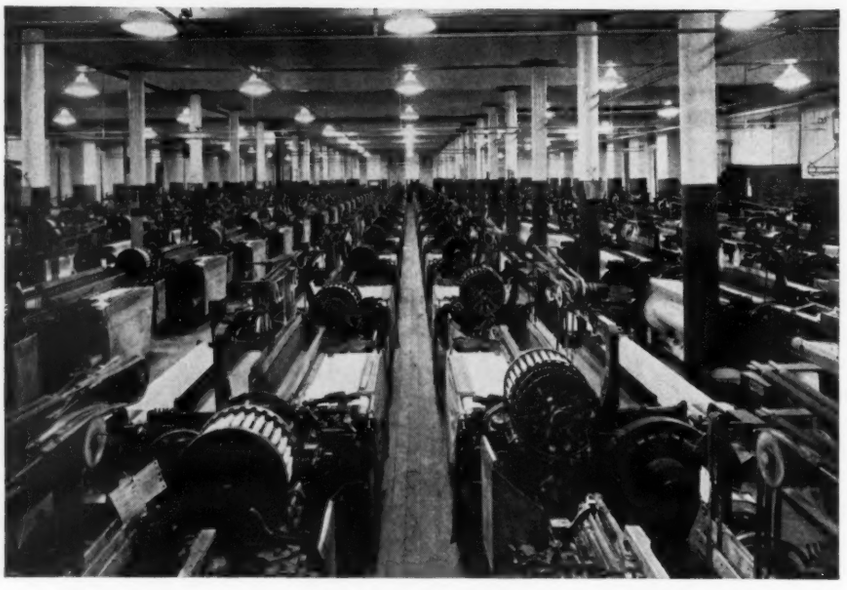
Where some customers have not seen fit to use the lamp sizes which were recommended, we have often been successful in getting them to wire their buildings for the recommended wattage which we feel is very nearly as good, because sooner or later there will be a need and demand for higher illumination levels and the wattage necessary will be added. There will be no handicap in increasing the wattage then, because no additional money need be spent for the necessary wire capacity. The cost of the wiring installed at the time of the original installation will, in practically every case, cost considerably less than when it must be added later.

Contacts with other groups besides architects have been found to be helpful in selling lighting. Eyesight specialists, electrical inspectors, window display men, paint merchants and salesmen, jobbers' salesmen, store fixture manufacturers and, of course, electrical contractors, all have an interest in lighting. The progressive individuals of these various groups are anxious to obtain information and data on lighting. Their interest transmits this information to the people whom they contact and in many instances they recommend the services of the lighting specialists or give them leads to excellent prospects.

Demonstration lectures before civic luncheon groups, merchants' meetings and other organizations serve to arouse an interest in lighting and also are excellent indirect publicity for the services of the lighting department. The demonstrations used have not always been practical, but rather spectacular and entertaining. While putting over such demonstrations there is plenty of opportunity to get across pertinent lighting and seeing facts which alone might be dull, too technical or otherwise uninteresting to these groups. A little showmanship worked into a lecture program is more than worth any additional expenditure involved in equipment.

The Sight-Meter is probably the most valuable tool we have in selling lighting. It takes the guesswork out of the interview with the prospect. It arouses interest and opens up an opportunity to talk to prospects who might otherwise be difficult to reach.





Weave room of the Chadwick-Hoskins Company at Charlotte, N. C., before and after relighting

Above—Lighted by 90 100-watt drop cords, producing spotty illumination averaging 5 ft.-candles with attendant glare and sharp shadows from bare lamps. Below—Combination "Glassteel" units, each equipped with one 400-watt high-intensity mercury-vapor lamp and three 150-watt incandescent lamps, increased the level of illumination to an average of 40 ft.-candles. Increased connected load 47.1 kw.

We have found that it has enlisted the support of electrical contractors who had no other interest than to sell a lighting fixture regardless of the result it would produce. Where, before, interest may have been concentrated on the fixture and size of bulb, now the meter shows the customer the illumination result, which is the logical reason for the purchase of the equipment. Thus proper size fixtures and adequate wattage can more readily be sold. Several small office relighting jobs have been sold on "cold" calls merely by showing the prospect that the meter indicates insufficient illumination.

The relighting of the Aug. W. Smith department store in Spartanburg, S. C., was sold in two hours time by showing the lack of illumination by the Sight-Meter. Fortunately, the wiring in this store was adequate. The original lighting system in this store consisted of sixteen 300-watt lamps in glass-inclosing globes which produce 6 ft.-candles average illumination. In addition to the low illumination level, the brightness of the globes was objectionable and caused many annoying reflections on the tops of showcases and other specular surfaces. The new system consists of sixteen "Duplexalites" equipped with 750-watt lamps, which raised the illumination to a level of 16 ft.-candles. Incidentally, the lighting sale was responsible for a new acoustical ceiling and repainting.

Removal of a paint store was the occasion for furnishing a lighting layout which would fittingly tie in with the Better Light-Better Sight activity. The result is a general system of indirect lighting with "Silvray" units employing bowl-silvered 500-watt lamps producing 20 ft.-candles and concealed lamps to highlight paint and wallpaper samples. Thus this store practices the preachment of better seeing through good lighting and paint and is a good booster for similar high-class installations.

The work of lighting specialists is often of a missionary nature and time is all that is necessary to bear the fruits of sincere effort. Our lighting specialist worked with the executives of the Meyers-Arnold department store at Greenville, S. C., for more than four years before it was finally decided to go ahead with lighting improvements. However, when the time came for action, the executives had such implicit confidence in our lighting specialist that they told him to dictate every detail of the job and they would order his directions to be followed to the letter. The result is the completion thus far of the entire first floor and part of the second floor in a complete relighting program, in which 42 1,000-watt totally indirect units have been used on the first floor, with plans for a total of 54 500-watt units on the second floor. This represents an increase of 45 kw. over the old lighting system.

Likewise, several years contacts with the executives of Ivey's department store, Charlotte, has resulted in a replacement of eight 300-watt glass-inclosing globes with eleven 750-watt semi-indirect units in the accounting department, raising the illumination from 4 to 20 ft.-candles, and 48 glass-inclosing globes with 200-watt lamps replaced by as many 750-watt units on the entire second floor.

Some of the best lighting jobs develop through other lighting activities of the company. For example, during one of our I.E.S. portable lamp campaigns the president of a hosiery mill at Hendersonville, N. C., was sold a floor lamp. So impressed was he with the lighting result produced by this lamp in his home that he decided to have new lighting installed in his mill which would equal the fine quality of light delivered by his I.E.S. lamp.

He called the company's local manager and asked him to send one of our lighting specialists to see him, saying that he wanted indirect lighting in his mill. Since indirect lighting is rather unusual for a mill, Paul Tysinger, lighting specialist, gave him complete information regarding layout, costs and individual advantages of three different systems, one using totally indirect units as originally requested, one employing "Glassteel" diffusers with incandescent lamps and another with combination units using high-intensity, mercury-vapor and incandescent lamps. From the very outset Mr. Katzenmoyer, president of the mill, was so sold on indirect lighting that he insisted on that system for his mill.

In discussing these various systems, Mr. Tysinger talked in terms of seeing and Mr. Katzenmoyer, having himself experienced the contrast between poor and good seeing in his own home, became so impressed with the need for comfortable seeing conditions for his workers that he has equipped a special room in the mill where an eyesight specialist periodically tests the eyes of the 350 employees.

Fortunately, the ceiling in the mill was plastered and other conditions were favorable for indirect lighting. Otherwise, Mr. Tysinger would, of course, have discouraged its use. The wiring, location of outlets and painting directions were followed explicitly as specified. The system consists of 120 totally indirect "Ivanhoe" units, each equipped with a 500-watt inside frosted lamp. A level of illumination of 25 to 30 ft.-candles is produced throughout the mill.

It is interesting to note that the lighting load of these 120 units totaling 60 kw., or approximately 80 hp., exceeds the total power load, which is 75 hp. Other lighting in the stockroom and other parts of the mill increases this difference still further.

It was learned that an extensive modernization program was about to be completed at the Chadwick-Hoskins Company rayon weave room in Charlotte, N. C., which included many items, excepting the lighting, and involved a relatively large investment. The executives of this mill are progressive, but very careful and efficient operators. Working with the local electrical contractor who handles the electrical work in the mill, the advantages of better seeing as provided by a high level of illumination was pointed out. Here high-grade rayon cloth was being woven, which is quite expensive material. Inability to see quickly and easily the flaws and defects from various causes while weaving would decrease the value of the product. The cost of installing and operating the most up-to-date lighting system would be only a small percentage of the money spent for other improvements.

The result was the installation of 70 "Glassteel" - type combination units, each employing one 400-watt, high-intensity, mercury-vapor lamp and three 150-watt incandescent lamps. This system replaced 90 drop cords, each equipped with 100-watt lamps which provided spotty illumination averaging only 5 ft.-candles. The new system raised the illumination level to an average of 40 ft.-candles.

Good business can be had

Lighting service can show a definite return which is as valuable a load as can be promoted by a utility. An activity which can average a horsepower or more in each socket of the larger jobs and which has a high average of hours of operation certainly is desirable. For each horsepower installed the customer is called upon to invest a relatively small amount, which, furthermore, is not financed by the utility company. After the installation is in there is no service necessary on the part of the company other than to deliver energy to the meter. Moreover, in rendering a lighting service, the aggressive, resourceful specialist can build good will and respect for the company among important and influential groups not usually reached by other departments.

The consciousness awakened by the Better Light-Better Sight activity, the new selling tools in the form of the light meters, visibility meter and various demonstration apparatus and the sales ammunition provided by the New Science of Seeing provide unlimited opportunities in building load in this fertile and desirable field.

Sherwin-Williams retail paint store, Charlotte, N. C., has 20 ft.-candles of illumination besides localized lighting to provide a high level of illumination on paint and wall paper displays

Profitable Load, Cost

Kansas Company Adapts Two Programs to Cities and Small Towns—White Fleet Set "Better Light-Better Sight" Talk Marathon in Motion

Whether the Better Light-Better Sight campaign gets anywhere depends very largely on what the utilities do in organizing to make the topic the talk of the town. At Cleveland recently all eyes were turned to Kansas. Not only does the state grow presidential timber but it has found how to induce its electric customers to get "lit-up" to the tune of 16 new kw.-hr. per month. Let the man who schemed it retell it as he told it at the April conference at Nela Park.

SINCE starting our home-lighting movement on December 1, 1935, on the "crew operation" basis, we have canvassed 31 per cent of our residential customers, but have actually interviewed 10 per cent. From our first four months' experience we know that this operation is a plan whereby a utility company can build profitable load at a reasonable cost and at a satisfactory pace.

We have found our costs reasonable. If the costs appear somewhat excessive we should give some credit to the humanitarian side of the Better Light-Better Sight service. I believe it is impossible to make the statement that any well-planned constructive home-lighting movement carries an excessive cost, if the costs are completely analyzed and considering the value of service to our customers. It means so much to the well-being and happiness of people in their daily contacts with each other as 87 per cent of all impressions come through the sense of sight.

Not content with initial pace

The Kansas Electric Power Company started its first home-lighting activity December 1, 1934. At this time five people (four girls and one man) were employed to spend full time on home-lighting work. Those who were employed were all inexperienced in home-lighting work. All received their preliminary training in Kansas City at the General Electric School, presented by a Nela Park group of home-lighting specialists under the direction of Miss Mary Webber. This was an excellent school.

During the period December 1, 1934, to December 1, 1935, we averaged only four full-time home-lighting representatives due to changes in personnel. During this period 932 I.E.S. lighting units were sold and the net kilowatt increase was 472, at a cost of 43 cents per dollar of EAR. This pace was too slow.

As a result of this limited activity it was decided in November, 1935, to enlarge the home-lighting department. The new organization started work December 1, 1935. The organization consists of one lighting director, a crew manager, a crew of five junior salesmen, two additional lighting advisers, supplementing our four regular lighting advisers. After starting the plan and gaining experience, additional personnel was added.

Experienced lighting salesmen were not to be found. The basis for selection of salesmen is:

1. *Character* — Due to the rapidity with which we cover the territory with this activity we felt that honesty was the first requirement for our junior lighting salesmen

2. *Sales Ability*—Appearance, education and natural ability.

3. *Age*—Ranging from 23 to 27 years of age.

4. Unmarried.

At the beginning of our expanded home-lighting movement we paid a base salary of $60 per month plus a commission of 15 per cent on all I.E.S. units and "Mazda" lamps sold. We soon found that this plan was not right and changed the compensation to a livable straight salary. Salaries are based upon the ability of the individual to produce results.

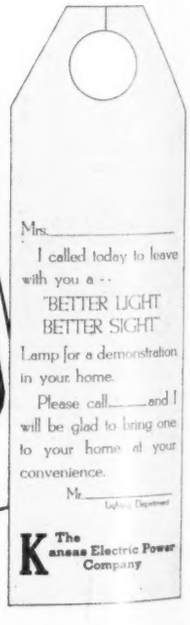
Our experience has convinced us that lighting advisers should be well matured, have a striking personality, tactful, enthusiastic, sincere and proud to be a home-lighting representative. Lighting advisers are paid a livable salary, the amount depending upon the ability of the individual.

A three-day training school for all home-lighting employees was conducted by our assistant commercial and new-business manager and crew manager with the assistance of a rep-

SIGHT
IGHT is Man's most precious possession. It is a valuable sense that once lost can never be regained.
E. S. Lamps are designed to protect eye-sight. They eliminate glare and shadow, giving a proper distribution of light for critical seeing.
OOD LIGHT is cheap. Improper light is expensive because it always causes "eyestrain".
ELP your children's progress by having the proper light for their studying. Every home needs a "Better Sight" Lamp.
ODAY is the time to protect your eyesight. Call today for a free demonstration of "Better Light —Better Sight" in your home.
EYE-STRAIN?
The Kansas Electric Power Company

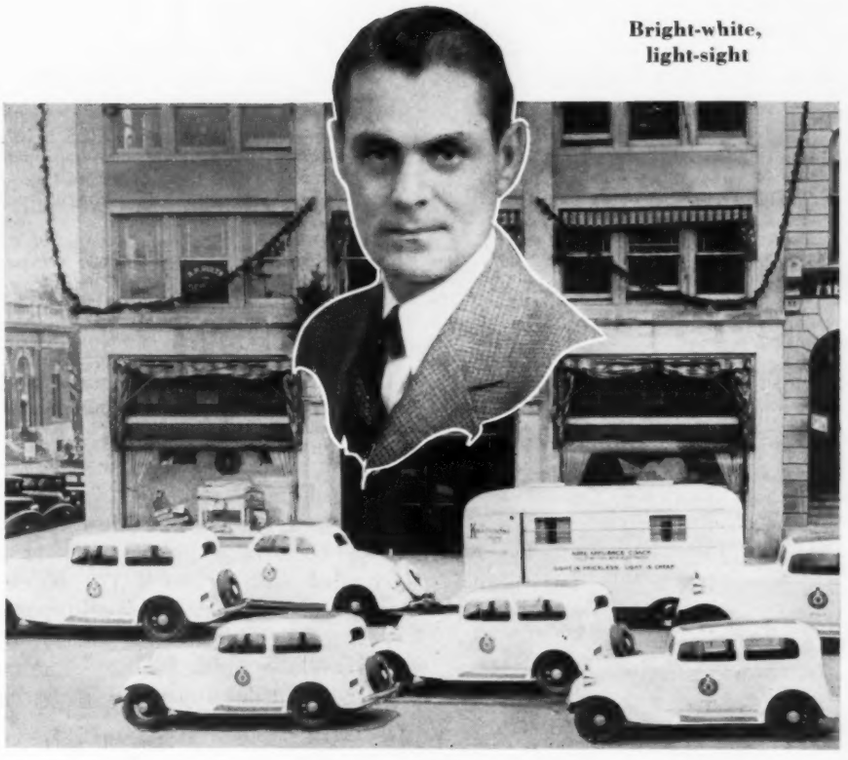
Emphasis is constantly on seeing

She finds this on the doorknob when she gets home


Mrs.
I called today to leave with you a . .
"BETTER LIGHT BETTER SIGHT"
Lamp for a demonstration in your home.
Please call and I will be glad to bring one to your home at your convenience.
Mr.
The Kansas Electric Power Company

Reasonable, Pace Satisfactory

By W. F. JORDAN
Commercial and New-Business Manager
Kansas Electric Power Company, Lawrence



Bright-white, light-sight

resentative of the Kansas City office of the incandescent lamp department, General Electric Company.

We now have all lighting people enrolled in the LaSalle General Electric Home Lighting Course.

Plan involves two methods of operation

The plan is set up for two definite operations.

Operation "A"—A crew operation to cover 15,645 residential customers in the four large towns served:

	Residential Customers
Leavenworth	4,538
Lawrence	3,904
Emporia	3,793
Parsons	3,410
Total	15,645

Personnel for this operation consisted of one crew manager, three junior lighting salesmen and three home-lighting advisers.

Automotive equipment for this operation consists of one appliance coach used by the salesmen for the distribution of I.E.S. units and each home lighting adviser is furnished with a small car. All the equipment is painted white.

Operation "B"—A small crew operation is maintained to reach the remaining 5,392 customers served. The following towns to be worked under this operation:

	Residential Customers
Eureka	965
Council Grove	719
Bonner Springs	418
Madison	340
52 smaller towns and communities	2,950
Total	5,392

Automotive equipment for operation "B" consists of a panel delivery car painted white.

Original approach not adequate

A simple piece of literature on Better Light-Better Sight was sent to all customers in the neighborhood to be visited by the lighting coach approximately two days ahead of the call. A junior salesman then called on those customers. His equipment consisted of a Better Light-Better Sight visualizer, a sight meter and a short, concise story on "Better Light-Better Sight." The primary function was to place one or more of the various types of approved lamps in the customer's home on trial. The lamps were left in the homes three or four days. At the end of this period the junior salesman called back to the homes where the lamps had been left and closed the sales or removed the lamps.

In practically all cases the customer purchased only one lamp from the junior salesman. It was then our plan to send the home-lighting adviser to the home within two weeks to give the customer a complete story on "Better Light-Better Sight" and attempt to place more wattage in use, either through the sale of additional portables or increasing wattage in present lamps. It was our belief that the results of the advisers would be greater since the customer now had a sample of modern lighting.

This plan did not work and there were three very definite reasons:

1. The customers felt that they had received the complete Better Light-Better Sight story from the junior salesman.
2. The customers felt that we were calling on them entirely too many times in such a short period.
3. The program was degenerating into a lamp-selling campaign intsead of a home-lighting activity.

On January 1, 1936, we changed to a new method of approach.

A short personal letter was first sent to the housewife saying a representative would call and leave an I.E.S. lamp for free demonstration.

The second paragraph merely said: "This is a part of our Better Light-Better Sight program. We hope you will benefit from the use of this lamp as to eyesight conservation and find it an asset to your home."

The letter folds only once and goes into a standard size envelope. The envelope is addressed in long hand to the housewife. We find these are read.

In approximately two days a junior salesman calls at the home to leave the I.E.S. lamp. His job is to place the lamp properly, sell the customer on the ability of the lighting adviser and make an appointment for the adviser to call. If the housewife refuses a definite appointment for the adviser, he does not leave the lamp. He tells the housewife that he is neither a salesman nor lighting specialist.

If a lamp is left, the adviser then calls at the appointed time. She carries a General Electric lighting kit and makes a regular kit demonstration, giving no attention to the new lamp until she reaches the point in her story on

Table I—Five Months, Fifteen Workers, 250 Kw.

Personnel of fifteen consists of lighting director, crew manager, two large crew advisers (girls), two large crew lighting sales (boys), two small crew salesmen—advisers (boys), four division advisers, two division salesmen (boys).

Net home lighting added during this period (kw.)		249
Home lighting portable I.E.S. units sold		1,292
Table model study I.E.S. units	236	
Floor model study I.E.S. units	188	
Three-Lite Model I.E.S. units	314	
Pin-it-up-lamps	435	
Kitchen units sold	119	
Total estimated annual revenue based on $30 per kw. connected		$7,474.00
Total gross merchandise sales—lighting units		7,173.59
Total home-lighting expenses		5,989.50
Merchandise profit from lighting activity —40 per cent gross		2,870.00
Home lighting expenses less merchandise profit		3,119.50
Cost per dollar of estimated annual revenue to produce business		0.42

From the operation of the two crews ("A" and "B") we find the following results from our method of operation within the crews:

Period of December 1, 1935, to March 27, 1936:

		Per Cent of Residential Customers
Total number of homes contacted.	6,653	31
		Per Cent of Homes Contacted
Home "no one at home"	2,880	43
Homes "refused admittance"	1,415	21
Homes actually interviewed by salesmen	2,263	34
Number of I.E.S. units sold from demonstration	728	11

(50 per cent of I.E.S. units left on demonstration were sold)

Table II—Fifty Homes Add 7 Kw. in Three Months

Number of customers	50
Net wattage reported	7,155
Aver. added wattage per home	143
Kw.-hr. January-March, 1935	12,771
Kw.-hr. January-March, 1936	15,139
Kw.-hr. increase	2,368
Revenue January-March, 1935	$609.39
Revenue January-March, 1936	688.95
Revenue increase	79.56
Aver. added revenue per customer (3 mos.)	1.59
Value per kw. per year	44.48
Revenue per kw.-hr.	0.0336
Aver. kw.-hr. increase per customer per month	16
Aver. added revenue per year (31 per cent in first quarter)	$5.12

good lighting. Our advisers have found that in practically every case it is never necessary to mention the I.E.S. lamp that has been left on approval, as it is automatically brought into the conversation through the proper presentation of the "Science of Seeing" story, and it usually happens that the customer is only too happy to purchase the demonstration unit as well as additional lighting. In all cases the adviser attempts to increase wattage in existing equipment as well as doing a complete lighting job in the home.

Four items of merit in the plan

We are thoroughly sold on this new approach because—

First—The customer is sold on the ability of the adviser by the junior salesman's call. The lighting adviser then has an added prestige when she enters the home.

Second—We are selling more I.E.S. lighting units that will be used continuously by the customer by having the adviser call on an arranged appointment, telling the complete Better Light-Better Sight story.

Third—We find from our analysis of customers that have been given the complete Better Light-Better Sight story that they are making additional use of their present lighting equipment. Using also the I.E.S. portable lighting units.

Fourth—We know that every customer receives the complete story on Better Light-Better Sight and as a result public relations are also materially helped.

We find that each crew salesman arranged sufficient appointments each day to keep one lighting adviser plenty busy. Each home-lighting adviser is provided with a small car painted white and it is loaded with all types of approved lighting units to provide the girl available stock for any situation which might develop while filling her appointment.

Publicity adjuncts important

A large newspaper advertisement in the local paper always announces the arrival of the crew in any town. The remainder of our newspaper advertising is confined to sales material on "Better Light-Better Sight" and I.E.S. lamps.

All junior salesmen wear black derbies as a method of identification and all lighting ads carry the slogan "Watch for the Men in Black Derbies—they are our authorized Light Representatives."

We have limited our newspaper advertising in order to spend more money on the direct mail letter announcing the free trial of the I.E.S. lamp.

We have been fortunate in arranging talks before schools in all towns covered thus far in the operation. The topic of our talks has been "Better Light-Better Sight—Better Students." This is purely an educational talk on "The Science of Seeing" and is not commercialized in any way. We have found this to be our most profitable advertising medium. We arrange and present lectures to all grammar schools, junior high schools, high schools, and parent-teacher associations just as fast as appointments can be made.

Employee education

Employee meetings are held on each division upon the arrival of the lighting crew. We have excellent employee co-operation, which is essential if any plan is to succeed. There is no better way to sell Better Light-Better Sight than to have the employees so enthusiastic that their homes are a "Living Show Case."

Light Averts More Than Two in Five Night Deaths

[*Continued from page 55*]

ibility of pedestrians, the absence of glare, the chance to judge speeds and distances and benefit from silhouette illumination. They can be told also that the movement is well in progress—that more than 30 states have installations—that New Jersey alone has more than 100. These figures include sodium and mercury as well as incandescents.

In brief, what makes night different from day is the absence of light. Absence of light is attended by three-fifths of the accidents, but with only one-fourth of the traffic. Absence of light is largely what makes night travel six times as dangerous as daytime travel, and the ratio is getting worse.

Light is the answer. It enables seeing in time to stop or turn out. It enables a halving of the night-time accidents and the attendant fatalities. Most of the crashes and deaths occur on the now dark stretches of suburban and rural arteries.

By furthering the movement already set in motion, the utilities can get public credit for helping to avert 5,000 fatalities and ten times as many injured automobilists.

Money now being diverted from highway funds for non-highway purposes would, if restored, more than pay for the lighting of the present imperative mileage.

In the last analysis, it will be the electric utilities that will decide whether this movement dies aborning or goes to a magnitude of accomplishment that will redound largely to their credit.

Load Building by Light for Seeing

Appraisals of the Possibilities in Various Fields Supported by Data From Active Companies

LIGHTING has always been the primary service rendered by central-station companies. It is the service on which the industry was founded. It is still the one service uppermost in the public mind. But the use of light in the home has not kept pace with modern developments. It is susceptible of a large increase in its various fields of application.

Domestic service is furnished to about 21,000,000 customers who consume 7,200,000,000 kw.-hr. annually for lighting, aside from energy used for appliances. The average is around 340 kw.-hr. per customer. While it is generally recognized that the quality of home illumination is not what it should be, the smallness of the individual installations has largely acted as a deterrent to any but wholesale methods for its development and has, in many instances, led to a more or less nearly complete neglect. What can be done about it?

Study of the home-lighting load-building operations of six companies indicates a cost in all cases of less than a dollar per dollar of annual revenue obtained, and in several instances of about half that cost, although the low figures did not include certain expenses that should properly be taken into account and in one instance involved part-time work for which the cost allocation was presumably estimated.

From the table it is seen that the average increase per customer studied was 188 kw.-hr., and since the advisers averaged 2.26 calls per day the added load for a day's work was equivalent to 425 kw.-hr. a year. This is roughly equal to the energy used by a refrigerator.

That these six companies are not far from typical may be inferred from Table II, which covers sixteen companies and 62,500 demonstrations. The figures in line 11 in this more comprehensive table are of the same order of magnitude as those showing added wattage in Table I. Line 5 shows the percentage of homes that were revisited for checking. The difference between items 9 and 10 is that item 9 shows the actual added wattage placed in the sockets at the time of the first demonstration in all homes where demonstrations were made, whereas item 10 is the average added only in those homes which made changes on the first call and is included simply to indicate the adviser's ability to sell in those homes where she makes the initial sale.

Conservative Objective Lighting Loads

Field	Present Kilowatt-Hours	Objective Kilowatt-Hours
Residential	7,200,000,000	21,000,000,000
Industrial	5,500,000,000	20,000,000,000
Store	7,000,000,000	20,000,000,000
Office	1,100,000,000	4,500,000,000
School	300,000,000	1,500,000,000
Street	2,300,000,000	3,000,000,000
Highway	Negligible	1,500,000,000
Miscellaneous	3,300,000,000	6,500,000,000
Total	26,700,000,000	78,000,000,000

160 kw. per adviser per year

The figures in item 7 indicate the possibilities for wattage sales, mainly in the living room and in a few kitchens, to bring them up to present-day minimum lighting and seeing standards. Where a large percentage of homes are visited a second time to check them for results (item 5) the number of demonstrations the adviser can make is necessarily decreased, with a tendency to show lower values in item 14. But the figures are not conclusive on this point.

From the data it would seem that an average annual rate of 160 kw. per adviser may be achieved, after they have become experienced. Three of the companies exceeded this average; three others attained it; the remaining ten averaged about 94 kw.

New buildings provide another expanding market. As an indicator of present conditions one specialist points out that allowances for lighting equipment should be liberalized. He cites a case of only $150 allotted for fixtures in a $20,000 house! another of 0.57 per cent of the value of house and lot, and by way of contrast the case of an owner who, when shown, readily added the difference between the original $240 and the necessary $500 in a $30,000 home. He calls attention to the old kitchen, lighted for $13 with one center and one wall unit, contrasted with $80 in a good (better than medium) modern kitchen.

Store lighting constitutes another major field. Here again it is possible to cite definite data.

Sample towns show an average consumption for all classes of stores around 25 to 30 kw.-hr. per $100 of sales. If this is compared with the $25,000,000,000 of net sales reported by the census of distribution, the total

Table I—A Cost Study of the Home-Lighting Operation of Six Operating Companies

Company	Meters per Adviser	Customers Studied	Period Studied	Kw.-Hr. per Year Net Increase			Average Added Watts Connected per Customer	Burning Hours†	Average Calls per Day	Watts per Adviser per Day	Cost ¢ per $ of Inc. Ann. Rev.	Items Not Included in Cost
				0–50*	50–125*	125 and Over*						
A	75,000	197	6 months	94	136	148	292	466	2.87	838	0.88	Rent, executive and direct supervision
B	5,500	396	6 months	121	272	247	251	1,080	2.6	653	0.53	Rent, division and executive management
C	8,500	242	12 months		319		327	975	3.27	688	0.89	
D	1,500	689	5 months		163		227	720	Pt. Time 1.5	341	0.47	Rent, telephone, postage and executive overhead
E	17,000	225	12 months	62	64	81	268	240	2.3	616	0.76	
F	12,000	640	12 months		174		328	530	2.2	724	0.50	Rent, executive management
Avg.	19,900	383	9 months		188		282	670	2.26	643	0.66	

*Customer group, kw.-hr. per month, before demonstration.

†If we assume that all the increase in kilowatt-hours comes from the newly connected load, we find the burning hours for this load. This shows where "use" is being sold, and indicates the weakness of depending entirely upon "watts connected" for estimating the success of this activity.

for the country may be roughly estimated at 7,000,000,000 kw.-hr.

Our 30,000,000 school children

A survey of 38 schools with a total of 20,981 pupils, ranging from a three-room school with 94 pupils to a large high school with 2,480, showed an average of 10.7 kw.-hr. per pupil. This was for lighting only. Power was separately metered. But the individual schools ranged from 0.5 to 48.1 kw.-hr. Clearly there is little consistency here. Assuming this to be an average group, however, we arrive at 300,000,000 kw.-hr. as the present annual consumption.

Now let us turn to statistics for a complete school system in a city of 40,000 in Table IV. The average per pupil is 37, though one school is down to 6.4. In the annual report of the Board of Education the intention is expressed to have every classroom efficiently and adequately lighted as fast as finances permit. In this system the cost of lighting is a little more than 1 per cent of the entire expense for education. On this basis the total expense

Table II—Summary of 62,500 Demonstrations Made by Sixteen

*Companies operating in single urban centers †Companies operating in scattered territory	A* 10 Advisers or More	B* 10 Advisers or More	C* 10 Advisers or More	D* 10 Advisers or More	E* 10 Advisers or More	F* 10 Advisers or More	G* Less Than 10 Advisers	H* Less Than 10 Advisers	I* Less Than 10 Advisers	J* Less Than 10 Advisers	K† 10 Advisers or More
(1) Company has full-time lighting supervisor for approximately every 10 advisers	Yes	Yes	Yes	Yes	Yes	Yes	Yes ½ of year	Yes	Yes	Yes	No
(2) Number of months involved (Marked * if includes beginning of operation)	12	4	12	*12	12	12	12	2	2	12	*4
(3) Approximate number of demonstrations made	Over 5,000	Between 2,000 & 5,000	Over 5,000	Between 2,000 & 5,000	Over 5,000	Between 2,000 & 5,000	Between 2,000 & 5,000	Under 2,000	Under 2,000	Between 2,000 & 5,000	Between 2,000 & 5,000
(4) Per cent homes making wattage change at first demonstration	15	11	53	96	No Data	Advisers do not sell	7	Advisers do not sell	73	Advisers do not sell	26
(5) Per cent homes checked for results	42	23	40	12	80	100	13	47	No Data	106 (From previous year)	47
(6) Per cent homes checked in which wattage changes were found	82	95	81	100	57	84	100	83	60	80	93
(7) Average increased wattage recommended per home (mainly in living room and kitchen)	542	530	560	298	482	570	520	457	No Data	433	442
(8) Average increased wattage found in checked homes (in excess of original installation)	220	290	252	353	113	313	320	153	199	160	203
(9) Average wattage added on first call per demonstration made	48	37	130	221	44	None	9	None	152	None	60
(10) Average wattage added on first call in homes making change on first call	310	345	243	230	No data	None	140	None	209	None	232
(11) Average rate of sale in wattage (8) + (9) (Per cent of recommendation)	268 50	327 62	382 68	274 92	157 33	313 55	329 63	153 33	351 ?	160 37	263 60
(12) Approximate kw. added (estimated) per month per adviser (11) × (3) ÷ months ÷ advisers	12.5	13.1	19.3 (11.5 known)	6.4 (Current 16.4)	7.2	7.8 (known)	14.3	18	9.6	9.2 (known)	9.7
(13) Known wattage added per demonstration (counting only those homes actually checked)	140	105	231	230	95	313	51	74	No data	160	157
(14) Approximate demonstrations per day per adviser (20 days to month)	2.3	2.1	2.5	1.1	2.3	1.2	2.2	5.8	1.3	2.8	1.9
Remarks		Some adv. taken off for special work		Not 10 adv. for whole year change in personnel							Extra good initial training

Table III—Summary of Experience of 243 Utility Operating Companies as of January 1, 1936

Region	No. of Cos.	No. Res'l Meters	Number Home Lighting Advisers	Number Home Lighting Supervisors	Number Com'l Lighting Salesmen	Number Com'l Lighting Supervisors	Number Indus. Lighting Men	Number Indus. Lighting Supervisors	Number I.E.S. Lamps Sold in 1935 — Study Lamp	Semi-Indirect	Tot. Indirect	Number of L't Meters Cus. Own
New England	39	1,509,315	94	16	59	3	0	0	(0) 0	(0) 0	(0) 0	(39) 1,155
Mid. Atlantic	50	5,371,731	356	34	266	57	122	34	(27) 24,108	(23) 26,610	(9) 15,918	(42) 1,544
E. No. Central	52	3,754,436	248	28	156	20	42	4	(31) 45,224	(31) 17,254	(4) 3,215	(51) 1,498
W. No. Central	17	926,953	97	12	76	8	1	0	(10) 4,734	(10) 2,506	(6) 1,727	(14) 320
So. Atlantic	20	944,482	165	17	114	15	3	2	(13) 52,528	(11) 26,401	(5) 17,651	(15) 572
E. So. Central	20	922,007	71	3	32	1	2	1	(13) 12,952	(10) 7,964	(5) 5,379	(18) 416
W. So. Central	11	580,867	91	14	38	12	14	2	(7) 19,298	(6) 28,183	(5) 7,175	(11) 507
Mountain	13	400,108	73	20	39	7	2	1	(9) 8,920	(8) 7,859	(3) 250	(13) 347
Pacific	21	2,115,974	264	35	76	7	28	4	(14) 15,874	(12) 14,963	(7) 26,979	(17) 737
United States	243	16,525,873	1,459	179	856	130	214	48	(124) 183,618	(111) 131,740	(44) 78,294	(220) 7,096

Figures in parentheses indicate number of companies reporting on this item.

for classroom lighting in the entire country should be at least 1 per cent of $3,000,000,000 (*i.e.*, $30,000,000).

Results of a survey of the experience of 243 companies, covering a large percentage of the industry, are tabulated in Table III. These have been allocated among the nine geographic regions generally used in the census. This allocation, it should be stated, is only approximate, but is close enough for present purposes. Some deviations from the divisional lines were unavoidable.

Results have been good

An appraisal was made of the number of companies achieving good results in home, commercial and industrial lighting, respectively. For example, in home lighting 123 companies reported having good results. This looks like a rather poor showing, among 243, but since only 161 reported operating home-lighting activities it really indicates that 76 per cent of these got satisfactory results. In the South Atlantic group thirteen operated such activities and thirteen had good results; in the Pacific eleven out of twelve. Some of the percentages are considerably lower.

In commercial lighting 109 out of 170, or 64 per cent, had good results, and in industrial lighting 56 out of 109, or 51 per cent. Apparently more is being accomplished in home lighting than in the two other fields, although only two out of three report home-lighting activity and less than half report industrial.

Two conclusions seem warranted: Companies actively selling lighting are meeting with good results in home-lighting and fair results in other fields; many companies are not now going after this market.

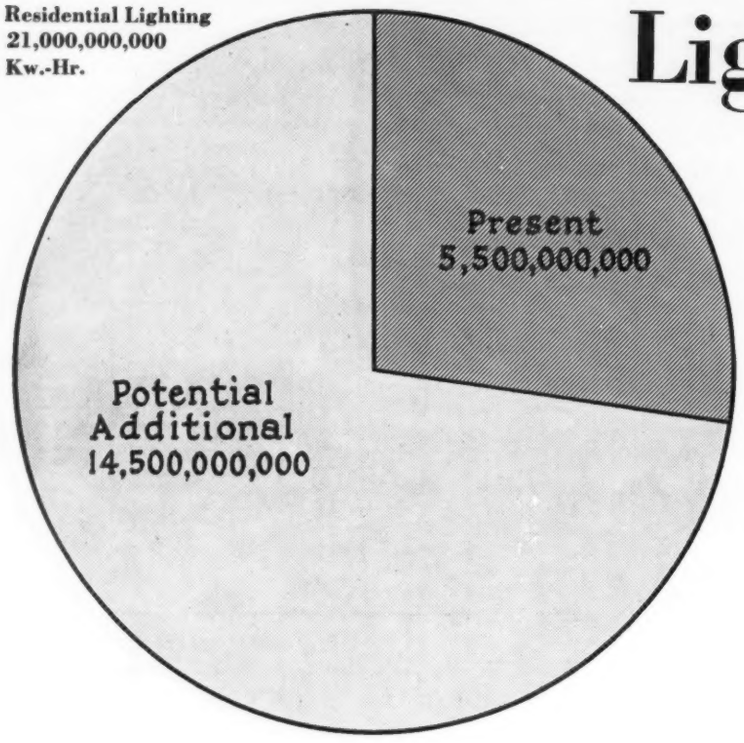
Companies

L† 10 Advisers or More	M† 10 Advisers or More	N† 10 Advisers or More	O† 10 Advisers or More	P† Less Than 10 Advisers
Yes	Yes	Yes	No	No
12	*14	*3¼	*4	4½
Between 2,000 & 5,000	Near 10,000	Between 2,000 & 5,000	Over 5,000	Under 2,000
No data	Advisers do not sell	67 (No merch. free lp. given)	17	No data
104 (From previous year)	72	18	41	100
Only homes making chgs. recorded	No data	75	59	100
520	500	330	382	455
342	251	175	112	150
no data	None	71	36	120
no data	None	103	204	No data
342 66	251 ?	246 75	148 39	270 59
10 8 (known)	11 2	8	8	6 5 (known)
353	182	102	83	270
1 4	1 6	2 1	2 3	1 2
Not 10 adv. for full year period				Only dem. counted that carry through emphasis on merchand'g

Table IV—School Lighting in Medium-Sized City

Buildings	Annual Lighting Kw.-hr.	Number Pupils	Lighting Kw.-hr. per Pupil per Year	Annual Educational Cost per Pupil per Year 1934	Lighting Cost per Pupil
High School	104,832	1,764	59	$113	$1.13
Junior High	107,472	1,689	63	100	1 20
Elementary A	3,396	528	6 4	69	0 24
Elementary B	18,156	939	19	64	0 55
Elementary C	2,832	342	8	79	0 32
Elementary D	13,836	647	21	83	0 63
Elementary E	3,876	509	8	68	0 30
Elementary F	9,024	523	17	69	0 56
Elementary G*	432	29	15	178	0 60
Totals	256,956	6,970	Avg. 37	$ 90	$1 01

*Special school for handicapped children.



Light for Seeing Will Triple Sales

Now 26,700,000,000 Kw.-Hr. —A Conservative Objective Is 78,000,000,000 Kw.-Hr.

PRESENT sales of energy for lighting can be multiplied threefold without overshooting conservative objectives in the various fields, to the benefit of the utilities, manufacturers, dealers in lighting equipment and, last but most important, the general public. But it requires co-operation. Co-operation by the various agencies involved. Co-operation even by the public as the chief beneficiary. It requires consistent effort as befits the development of a large market, a load builder as promising as the refrigerator. Progress has already been made. Successful methods have been developed. But they need to be more generally adopted.

The amount for energy used in the United States for lighting by various groups of customers can be estimated with sufficient accuracy for practical purposes. It comes approximately to 26,700,000,000 kw.-hr. Reasonable assumptions as to the amounts that ought to be used for adequate seeing—not to simulate daylight, but merely to bring the illumination up to satisfactory working levels — call for a total of 78,000,000,000 kw.-hr.

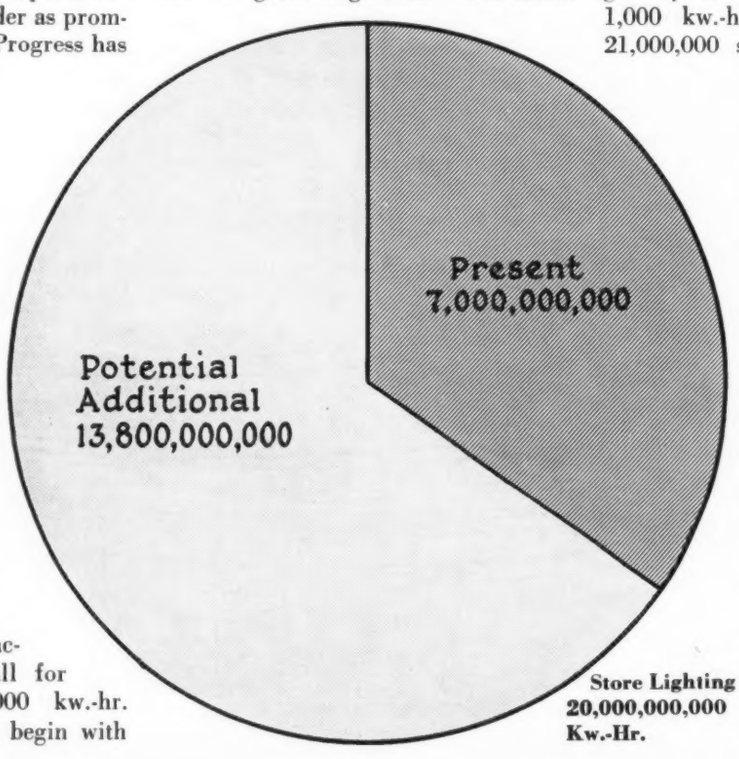
Home Lighting—Let us begin with the homes of the 21,000,000 domestic and farm customers. If we allot half the energy used by the former to lighting and a third of that used by the latter we get a total of 7,200,000,000 kw.-hr. Demonstrations lead to the acceptance of a prescription program of "I.E.S. accepted" lamps, which are either purchased at once or step by step, as the customer can afford the expense.

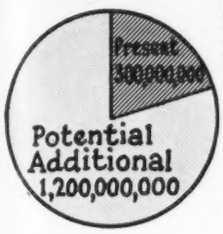
The resulting potential dealer market is of great magnitude. It is found that on the average two additional portables are called for, indicating potential sales of 40,000,000 new units aside from replacements. As representative for a modern normal home, not an elaborate one, the following quantities have been worked out:

	Cost	Watts, Properly Lamped	Year's Use, Kw.-Hr.
Fixtures	$260	2,800	460
Portables	150	2,550	1,040
Total	$410	5,350	1,500

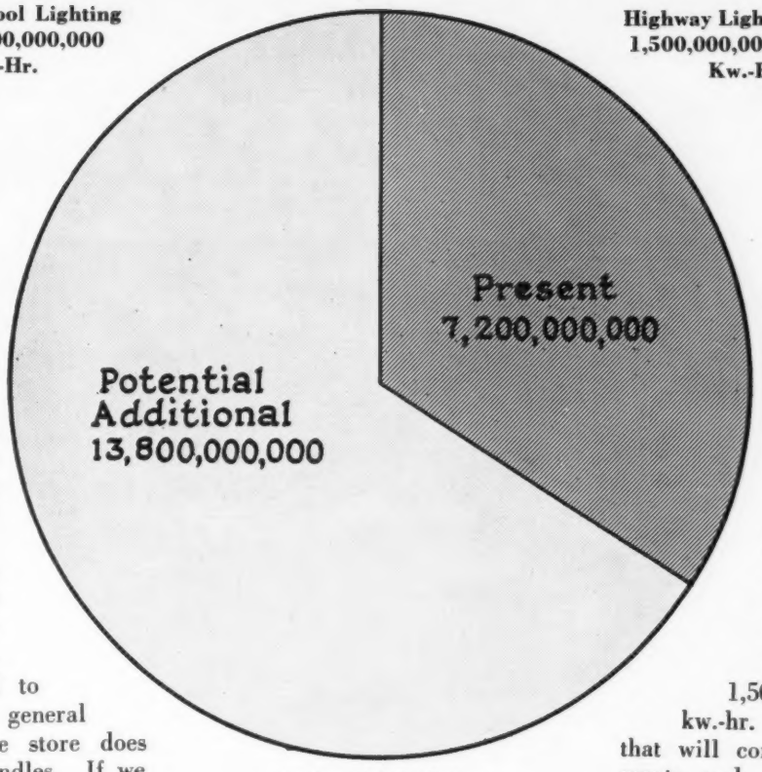
In view of these figures, and of the inadequacy of the lighting that now calls for a consumption of only 300 to 400 kw.-hr. by the average family, it does not seem extravagant to say that this average family could advantageously use and could afford to use 1,000 kw.-hr. annually. There are 21,000,000 such average families, a 21,000,000,000 kw.-hr. market.

School lighting concerns the eyesight of 30,000,000 children, in a million classrooms. Tests show that even on a bright day the illumination at desks remote from the windows is likely to be only 3 to 5 ft.-candles, hence should be supplemented by artificial light. With the present general level multiplied by four or five in the darker parts of the rooms and the time of use materially extended by photocell control—the need of this has been demonstrated by test—an increase of 1,500,000,000 kw.-hr. is



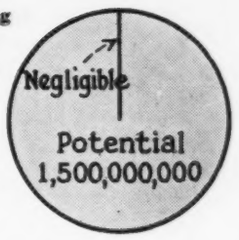


School Lighting
1,500,000,000
Kw.-Hr.



Industrial Lighting
20,000,000,000 Kw.-Hr.

Highway Lighting
1,500,000,000
Kw.-Hr.



a reasonable objective.

Commercial Lighting—Retail commercial customers number about 3,800,000. They buy 14,000,000,000 kw.-hr. a year. Most of this is for lighting, though it includes some small power.

The 1,500,000 stores take about 7,000,000,000 kw.-hr. annually for lighting. A rather substantial survey is said to have indicated that the general lighting in the average store does not exceed 6 or 7 ft.-candles. If we adopt 20 ft.-candles as a reasonable objective—recent large installations have gone as high as 60 or 70—the present total will be increased threefold to 20,000,000,000 kw.-hr.

Office lighting can add 3,400,000,000 kw.-hr.

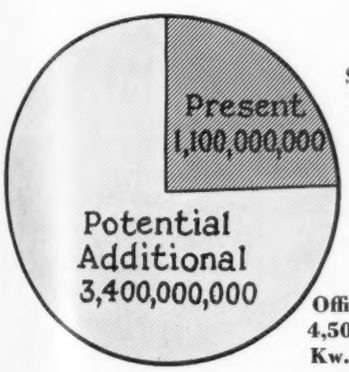
Office lighting comprises another considerable fraction of the 11,200,000,000 kw.-hr. of commercial lighting. Only a rough guess can be made on the basis of certain data of the federal real property inventory. It may be taken as being a little more than 1,000,000,000 kw.-hr. Present installations are giving three or four times the old foot-candle levels, and therefore point to 4,000,000,000 kw.-hr. as a reasonable goal. The appeal here is to conservation of eye-sight, greater accuracy in clerical work, convenience and the appearance of better lighted offices.

Miscellaneous Lighting—To make up the total lighting load there remains a miscellaneous group taking 3,300,000,000 kw.-hr.—churches, theaters, hotels, billboards, service establishments and others—in so far as they have not been included in preceding groups. Without attempting to evaluate each class separately and in view of rising levels a doubling of present consumption may be assumed, bringing it up to 6,500,000,000 kw.-hr.

The Census of Manufactures reports 8,500,000 industrial wage earners in the United States. Data on floor space in one important region, the Cleveland metropolitan area as developed in the real property inventory and with moderate adjustments, indicate 560 sq.ft. to be probably a fair national average per wage earner. That makes a total of 4,800,000,000 sq.ft. Suppose 30 per cent is idle, 70 per cent active manufacturing area. Recommended practice in the latter, say at 20 ft.-candles, would call for 3 watts per square foot. On the active 390 sq.ft. per employee this would mean 1,170 watts. On the 170 sq.ft. of unproductive area one watt per square foot would serve. The total per employee is 1,340 watts. With higher levels the hours of use would increase: Assume 1,500 hours a year, 2,000 kw.-hr. Add the special lighting that will come with other improvements and a round 20,000,000,000 kw.-hr. may be set as the reasonable objective.

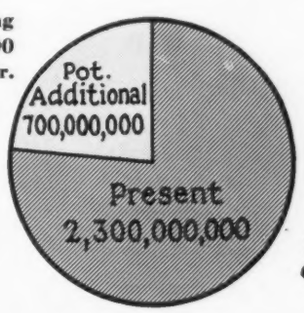
The result of analyses of accident statistics may be summarized by stating that about three-fourths of the night accidents on rural highways occur on some 50,000 miles of well-traveled road.

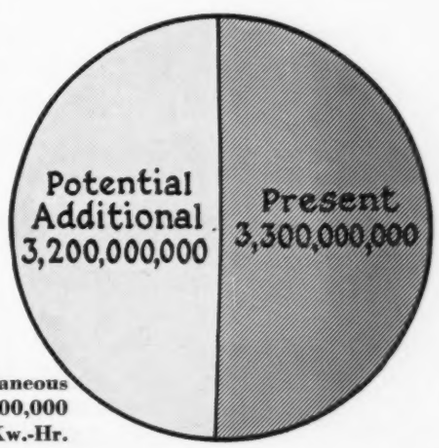
Assuming a cost of $50,000, per mile, or $2,500,000,000 total; initial cost of installing safety lighting $125,000,000 to $150,000,000, or 5 to 6 per cent, and an annual operating cost for lighting, exclusive of investment charges, of $30,000,000 to $50,000,000, there is balanced against this cost an estimated economic loss from preventable night accidents of $300,000,000. The annual energy consumption, at 30,000 kw.-hr. per mile, would be 1,500,000,000 kw.-hr.



Office Lighting
4,500,000,000
Kw.-Hr.

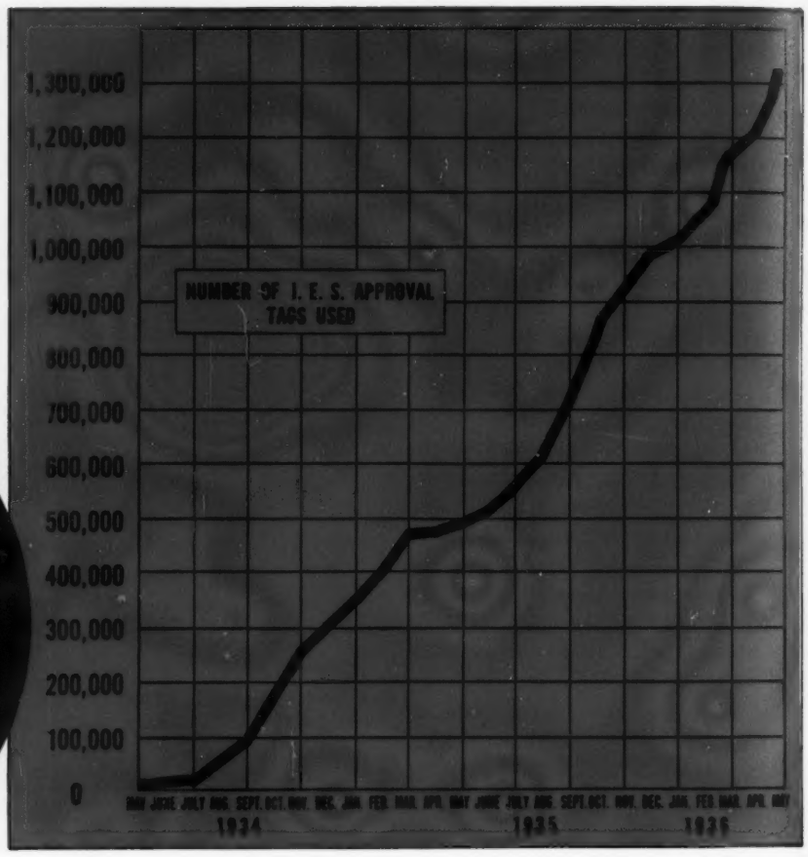
Street Lighting
3,000,000,000
Kw.-Hr.





Miscellaneous
6,500,000,000
Kw.-Hr.

THE RECORD OF *I-E-S Better Sight Lamps...* as LOAD BUILDERS



Starting at zero, less than two years ago, sales of I. E. S. Better Sight Lamps have long since passed the million mark—and every lamp in use means bigger load.

Portable lamps are the universal load builders.

The experience of nine companies, for example, shows that every 100-watt I. E. S. Better Sight Lamp adds from $1.70 to $2.40 per year (based on a 5c current rate). And every 100-200-300-watt I. E. S. Better Sight Lamp adds from $4.00 to $5.00 per year.

People may do without many modern conveniences, *but they must have light*... and today they are getting much of it through portable lamps.

Prior to the advent of I. E. S. Better Sight Lamps, people were content to get along with insufficient light. They weren't *light conscious.*

In millions of homes, the light of a sixty-watt lamp was considered ample for reading, sewing, or any close-seeing task. And in millions more

Better Sight I·E·S *Lamp Makers*

MEN OF THE INDUSTRY

E. H. Adams New President of Canadian Association

Ernest H. Adams, vice-president of the British Columbia Electric Railway Company, Vancouver, B. C., was elected president of the Canadian Electrical Association at the recent annual convention. A native of Ireland, Mr. Adams was associated with the B. C. Electric secretary's office in London before going to Vancouver in 1908.

He was appointed chief accountant, Victoria branch, in 1912, comptroller,

1917 and vice-president in 1929. Mr. Adams is a past-president of the Canadian Credit Men's Trust Association (B. C. division), Vancouver Electrical Association and of the Vancouver Electric Club.

•

▶ EUGENE HOLLAND has become associated with Sanderson & Porter in the capacity of resident manager in Chicago.

▶ L. C. HOFFMAN, new-business manager for the Northern States Power Company at Chippewa Falls, Wis., for the past seven years, has been transferred to the company's office at Eau Claire, Wis., where he will have charge of rural sales for the entire Wisconsin division.

▶ A. J. HURT has been appointed district manager of the Carolina Power & Light Company at Sumter, S. C. He succeeds Marvin A. Doughty, whose recent death left the position vacant. Mr. Hurt went to Sumter two years ago as Mr. Doughty's assistant from Henderson, N. C., where he was an assistant manager. He is prominently identified with the civic and business affairs of Sumter.

▶ CARL W. HANER, who has been manager of the National Utilities Company at Statesville, N. C., for the past five years, recently assumed his duties as manager of the Bluefield Gas & Power Company of Bluefield, W. Va. Mr. Haner succeeds John H. Pritchard, who has been promoted to manager of the People's Gas Company at Beaumont, Tex.

▶ HARRY ARTHUR HOPF, well-known authority in the field of management, recently announced a new partnership of Hopf, Kent, Willard & Company. The new company is the result of a merger of H. A. Kopf & Company of New York and Bigelow, Kent, Willard & Company of Boston.

▶ FRED STERLING, who has been attached to the staff of the British Columbia Electric Railway Company's store at Abbotsford, B. C., for some time, has been appointed district representative for the company, succeeding E. Webster, who has been seriously ill for several months.

•

A Native Returns

C. G. Frantz, president of the Apex Rotarex Corporation, Cleveland, O., recently returned from a visit to Europe, where he spent several weeks extending the manufacturing facilities and distribution of Apex appliances in European countries.

"I found," Mr. Frantz said, "that electrical appliances made by American manufacturers are enjoying increasing popularity throughout Europe. . . . The people of Europe are accepting the American standard of living as provided by modern electrical household appli-

ances, which is being reflected in the increased demand for home labor-saving equipment."

While in Europe Mr. Frantz completed permanent arrangements for the manufacture and distribution of Apex appliances in England, and made surveys in other countries which it is hoped will eventually further the manufacturing of Apex appliances abroad.

H. G. R. Bennett Heads Iron and Steel Engineers

Herbert G. R. Bennett, assistant general superintendent, Carnegie-Illinois Steel Corporation, Duquesne Works, has been elected president of the Association of Iron and Steel Engineers for the

coming fiscal year, succeeding G. R. Carroll.

Mr. Bennett began work in the steel industry in 1901 as secretary to the chief engineer, American Steel Hoop Company. He went with Carnegie Steel Company, Youngstown, in 1907, as special engineer, later holding the positions of master mechanic, assistant superintendent of bar mills, and in 1933 he was advanced to his present position with the company.

Other officers elected are: First vice-president, L. F. Coffin, Bethlehem Steel; second vice-president, C. C. Wales, Otis Steel; treasurer, F. E. Flynn, Republic Steel; secretary, J. L. Miller, Carnegie-Illinois Steel.

•

▶ EPHRAIM M. NORWOOD, assistant treasurer of the Worcester, Mass., Electric Light Company, has been elected president of the Associated Retail Credit Men of Worcester.

▶ B. FRANK SMITH, in charge of claims for the Arkansas Power & Light Company at Pine Bluff, Ark., was elected president of the Southwestern Railway Claim Agents Association at its annual meeting in New Orleans recently.

▶ HARRY T. SMITH, traffic manager of Worthington Pump & Machinery Corporation, was tendered a testimonial luncheon on the anniversary of 50 years of continuous service with that organization at the Newark Athletic Club, New ark, N. J.

▶ DANIEL M. KAGAY has been appointed manager of dealer sales for the air conditioning division of Gar Wood Industries, Inc. He was formerly with the American Radiator Corporation. Mr. Kagay will appoint additional district

representatives throughout the country in order to meet increased business needs, and direct their activities.

▶ LORENZ Z. KIDDER, formerly the distribution engineer of the National Electric Power Company, New York, has been appointed associated utility engineer analyst of the Securities and Exchange Commission, Washington, D. C. Mr. Kidder has had broad, practical experience with public utilities. His former connections include the Union Gas & Electric Company in Cincinnati, Duquesne Light Company of Pittsburgh, Peninsular Telephone Company and Tampa Electric Company, both of Tampa, Fla.; Bronx Gas & Electric Company of New York, and the National Electric Power Company of New York. Mr. Kidder is a member of the E.E.I. and the A.I.E.E.

▶ A. G. STEINMAYER, formerly chief engineer, Line Material Company, South Milwaukee, Wis., recently was appointed vice-president in charge of engineering. Following graduation from the University of Illinois in 1916 Mr. Steinmayer became assistant chief engineer, Electrical Engineers Equipment Company, Chicago, Ill., and remained in that position until he joined the U. S. Army in 1918. In 1919 he returned to the Electrical Engineers Equipment Company and in 1920 he joined the engineering staff of the Line Material Company in the capacity of electrical engineer. He was appointed chief engineer in 1934.

A. G. Benard Sales Manager of Illinois Porcelain

Arthur G. Benard, who joined the Illinois Electric Porcelain Company as sales manager, brings to his new executive position a varied experience in the porcelain insulator field. He spent twenty-five years with the Locke Insulator Corporation, starting on the drafting board in 1910. In 1918 he was promoted to assistant sales manager and in 1923 was named district sales manager. In 1927 he was appointed general manager of the Locke plant at Victor, N. Y., and remained in that capacity until the plant was closed in 1933, when he became associated with the Baltimore plant.

In the spring of 1935 he resigned and was one of the co-organizers of Victor Insulators, Inc., was elected to the board of directors and named vice-president in charge of manufacturing. He resigned in June to become sales manager of the Illinois company.

•

▶ B. W. CREIM, formerly chief electrical engineer, Modesto (Calif.) Irrigation District, recently was appointed senior electrical engineer for the Rural Electrification Commission, with offices at Washington, D. C. Following a brief service in the U. S. Bureau of Standards, he was employed by the Bureau of Power and Light of the City of Los Angeles during the period 1919-1927. He served as instructor in electrical engineering on the extension division staff of the University of California from 1925 until he became identified with the Modesto district.

•

OBITUARY

▶ JOHN L. WILKIE, chairman of the board of the Central Hudson Gas & Electric Corporation and a member of the law firm of Gould & Wilkie, New York, died July 22 at his country home at Vail's Gate, N. Y., after a long illness. Thirty-five years ago he joined the late William R. Beal and his son, Thaddeus R. Beal, in the development of public utilities in the Central Hudson Valley, which resulted in the formation of the Central Hudson Gas & Electric Corporation. He was 71 years of age.

▶ GEORGE C. SHAD, dean of engineering and architecture of the University of Kansas, died July 9 at Pasadena, Calif. He was 58 years of age. He became ill while attending the recent convention of the American Institute of Electrical Engineers. Death was due to an intestinal ailment. He was a graduate of Pennsylvania State College and for several years was employed by the General Electric Company at Schenectady, N. Y., and by the Bureau of Standards in Washington. He became a member of the University of Kansas faculty in 1929.

▶ J. A. ROCKWOOD, valuation engineer, Portland General Electric Company, Portland, Ore., died July 4, of heart disease. He went to Portland in 1908 with W. S. Barstow & Company to install the first underground system of Portland General Electric Company's predecessor, and on completion of this job he joined the engineering staff of the Portland company, where he has been estimator, statistician and valuation engineer in charge of the valuation department.

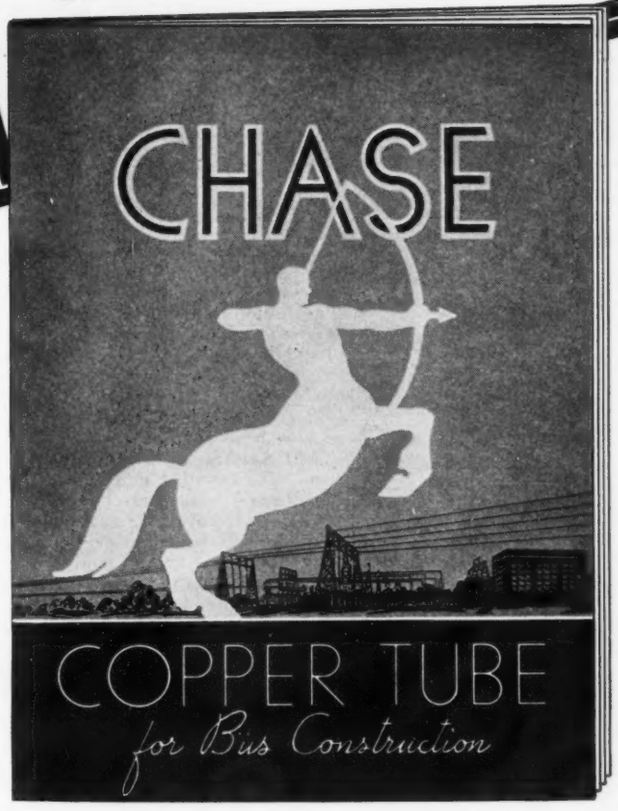
▶ HERBERT O. PHILLIPS, for many years president of the Phillips Wire Company, Pawtucket, R. I., died suddenly, of a heart attack, on July 13, at his summer home in Oak Bluffs, Mass. He was one of the best-known figures in the New England electrical manufacturing field. A native of Providence, R. I., he was 78 years old. He began making wire in 1885 in association with his brother, the late Edgar B. Phillips. Seven years later they built a plant in Pawtucket, which, when merged with the General Cable Corporation in 1925, was one of the largest plants of its kind in the country. Mr. Phillips had been engaged in rubber products manufacture since severing his connection with the wire company. He was interested in the Collyer Insulated Wire Company of Pawtucket at the time of his death and was also prominent in banking circles.

ROSEDALE FARM DEDICATED

Wide World

Harold L. Ickes as he threw the switch which formally opened the electrified Rosedale Dairy Farm near Herndon, Va. The farm will be used as an exhibit of the Third World Power Conference, which will be held in Washington, D. C., in September. Photo shows, left to right—Secretary Ickes, Gov. George C. Peery of Virginia and Morris L. Cooke, Rural Electrification Administrator

New Engineering Hand-book covers latest developments in Copper for Bus Construction



. . . send Coupon for your **FREE** *copy*

In this 40-page illustrated manual—now available for utility executives, designing and operating engineers—you will find the most recent developments in the use of copper for bus construction.

Complete with technical information, tabular data and engineering specifications, the manual constitutes a handbook of ready reference on all the following subjects: Round Copper Tube and Fittings . . . Square Copper Tube and Fittings . . . Flat Copper Bars . . . Red Brass Conduit and Fittings . . . Olympic Bronze Bolts and Nuts . . . Amelectric Wire and Cable.

The supply of these books is limited. Mail coupon *now* for your free copy.

CHASE BRASS & COPPER CO.

Incorporated

WATERBURY, CONNECTICUT

Subsidiary of Kennecott Copper Corporation

CHASE BRASS & COPPER CO., Incorporated
Dept. E-1, Waterbury, Connecticut

Please send me a free copy of your publication, "Chase Copper Tube For Bus Construction".

Name .....

Title ..... Company .....

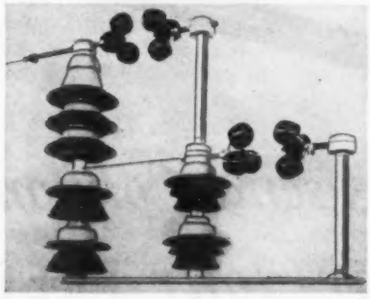
Address .....

City ..... State .....

NEW EQUIPMENT AVAILABLE

Control Gap

Impulse control gap for the protection of station equipment in the voltage range from 24 to 161 kv. has been newly introduced and is intended for the steep impulse range (1½ to 5 microseconds) which is the concern of engineers striving for continuity of service and minimum equipment damage. Its primary function is to divert nearby direct strokes with



Five sizes available—No. 32194 for 34.5 to 46 kv., No. 32459 for 69 kv., No. 34347 for 92 kv., No. 34364 for 115 and 138 kv. and No. 34411 for 161 kv. **Ohio Brass Co.**, Mansfield, Ohio.

identical performance on either polarity of the surge. The new device incorporates discharge points and a group of flux distributing insulators, thus combining the favorable features of both rod and sphere gaps. In wet weather the control insulators can be adjusted circumferentially and axially to establish any reasonable shape of time lag curve for optimum insulation co-ordination.

•

Stationary Compressor

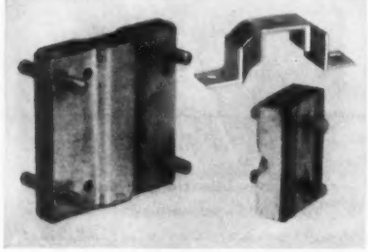
Available in sizes from 10 to 50 hp., pressures from 5 to 150 lb. **Sullivan Machinery Co.**, Michigan City, Ind.

Long life, low power cost and automatic operation are advantages claimed for new stationary duty air compressors of the single-stage, single-cylinder, double-acting horizontal type. Features stressed are double row main bearings, replaceable cylinder liner and crosshead guide, tinned piston and crosshead and long life valves.

•

Vibration Insulators

Rubber-to-rubber, vibration-proof mountings of the double-shear type designed for the bases of motors, generators and other machinery are now available. These dampers consist of a highly age-resisting rubber bonded to two metal plates, one of which is fastened to the vibrating member and the other to the support or foundation.



Three types available—No. 1, capacity 800 lb. and 800 vibrations per minute; No. 2, for 200 lb. and 1,200 vibrations per minute; No. 10 (double-shear type), range of sizes for loads of 50 to 3,000 lb. and minimum frequency 1,000 vibrations. **B. F. Goodrich Co.**, Akron, Ohio.

•

Salt Bath Furnace

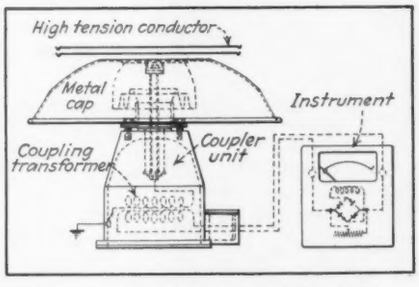
Designated as Ajax-Hultgren furnace. **Ajax Electric Co.**, Philadelphia, Pa.

A salt bath, heated by its own resistance between a pair of electrodes in close proximity, is the source of heat in a new salt bath heat-treating furnace recently marketed. Alternating current (d.c. would cause electrolysis) is passed through the electrodes, which, since they are close together, keep working space distinct from the heating region. A unique arrangement of electrodes utilizes electromagnetic forces to produce an automatic stirring action in the bath. Temperatures of about 1,500 deg. F. are obtained from this furnace.

•

High-Potential Indicator

Continuous indication of whether a transmission line is energized and the relative phase position for synchronizing two or more lines is given by a new potential indicator consisting essentially of a coupler unit, mounted on structural work in a calculated relation to the high-tension conductor, and an indicating instrument to which it is connected. Electrostatic charges picked up by the coupler pass to ground through the primary of a coupling transformer, the secondary of which is connected to the instrument. Output of the coupler unit corresponds in both phase and voltage to the high-voltage line. Therefore, the instrument will indicate when the line is energized. Similar units on corresponding phases of different lines may be "bucked." The resultant voltage indicated on the instrument will be proportional to the phase displacement between the lines. Thus it is also possible to synchronize across high-tension circuit breakers with this device.

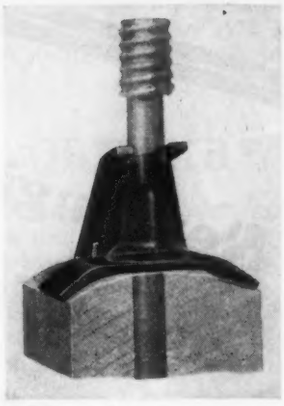


"Hipot" potential indicator. **Roller-Smith Company, New York City.**

•

Steel Pin Reinforcement

Uneven spans over hilly countryside, obstructions and right-of-way difficulties result in angle points with consequent straining and bending of steel insulator pins. Wind pressure and ice-coated conductors cause similar trouble. Built of galvanized steel, the L-M reinforcing washer gives standard steel insulator pins the strength to withstand abnormal stresses and thereby saves repair costs. The



Fits standard steel insulator pins of small base and of ⅝ and ¾-in. diameters. **Line Material Co.**, South Milwaukee, Wis.

washer has a broad base which comes in contact with the crossarm in such a way as to change stress distribution and strengthen the construction. Because of this, the washer will often permit saving the cost of one crossarm.

•

Pneumatic Type Controller

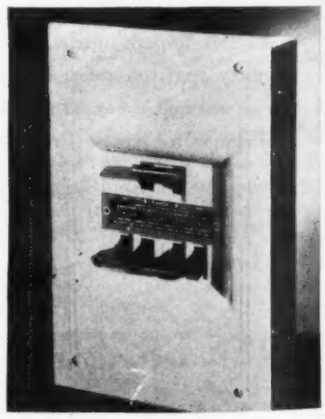
Master free-vane controller. **Bristol Co.**, Waterbury, Conn.

These controllers for temperature, time temperature, flow, liquid level, pressure, time pressure and humidity are offered primarily for application where a greatly reduced sensitivity (wide throttling range) is required and the load conditions fluctuate widely. The controller operates on the "free-vane" principle of control and is similar in many respects to the new "Ampliset" controller also newly announced by this company. It is equipped with a sensitivity adjustment, automatic reset and features that minimize hunting, prevent departure from control setting and make it possible to adjust the anticipatory effect to fit the process lag. The device is intended primarily to take care of more severe conditions encountered in processes such as sudden load changes, overshooting, etc.

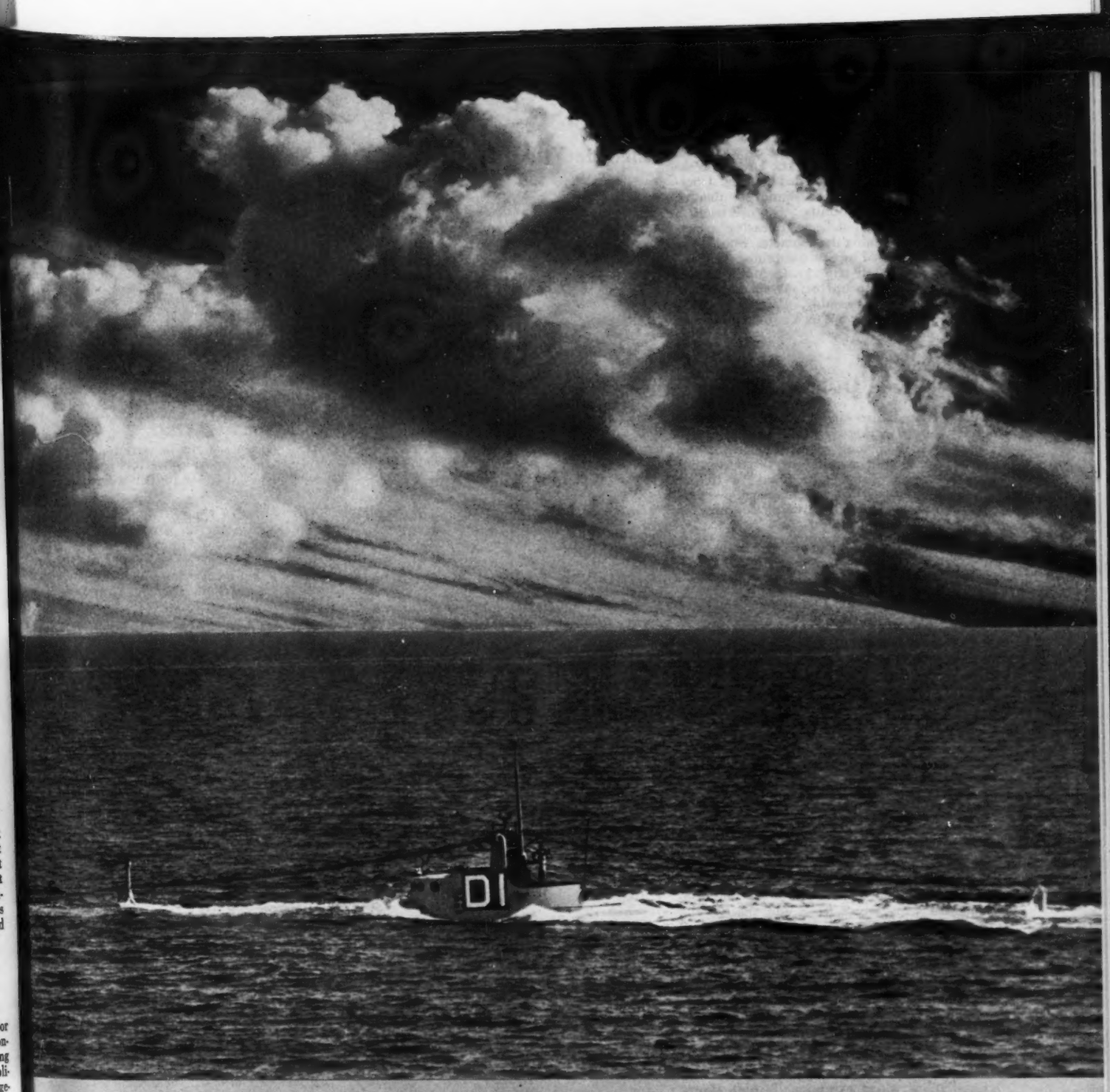
•

Multi-Breaker Load Center

This compact multi-breaker load center for residential service is designed to provide control and protection for circuits supplying power to lighting circuits, domestic appliances, ranges and water heaters. Hinge-



Provided with solid mains up to 70 amp. and for two-wire, 115-volt or three-wire, 115/230-volt a.c. solid neutral service; branch circuit breakers are provided in ratings from 15 to 35 amp. **Westinghouse Electric & Mfg. Co.**, E. Pittsburgh, Pa., and **Square D Company**, Detroit, Mich.



DECKS AWASH . . .

Men go below, staking their lives on the best equipment known to marine engineering . . . The use of SYNTHANE laminated bakelite in apparatus for the operation and control of submarines may suggest its applicability to your products where dependable insulation is required.

SYNTHANE LAMINATED BAKELITE
SHEETS • RODS • TUBES
FABRICATED PARTS

Send for Sample Book

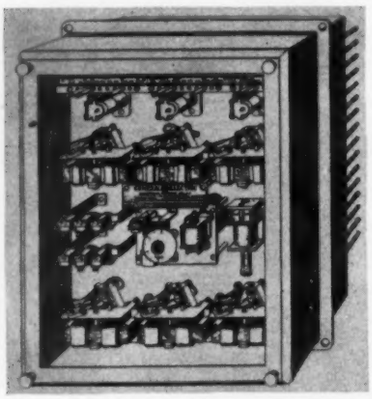
SYNTHANE
CORPORATION OAKS • PENNA

mounted in a cabinet, the load center consists of one or more small automatic circuit breakers grouped in a sealed molded housing. Operation of the breakers is similar to that of larger, more costly units. On overloads a bimetallic element deflects, releasing a contact bar and opening the contacts. Should the breaker be closed against continued overload it will immediately trip again. Molded housings accommodate up to four single-breaker poles in the same assembly. Pairs of breakers may be coupled for use as a two-pole breaker where desired.

•

Directional Distance Relay

High-speed, three-phase directional distance relay, newly marketed, combines all features of the three commonly required devices in one relay. The unit consists of three starting units, three resistance units and a timing unit. In addition two instantaneous overcurrent units, one for each of two phases, prevent



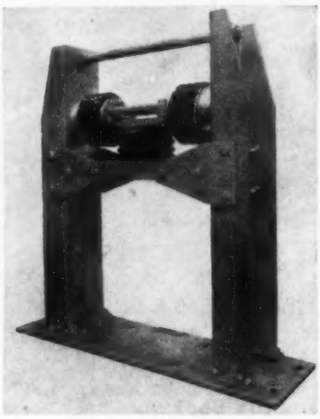
Type GCX 12-A. Case dimensions 16 x 20 x 7 in. **General Electric Co.**, Schenectady, N. Y.

tripping on fault currents less than their setting. The relay is connected to current and potential transformer leads and the control circuits to studs on the case. Operating time on nearby phase-to-phase faults will range from one to one and one-half cycles with corresponding currents of 20 to 10 amp. With more remote faults the time will increase.

•

Bus Supports

For insulating and supporting busbars in installations where exceptionally high short-circuit stresses may occur, this bus support



Delta-Star Electric Co., Chicago, Ill.

has been introduced. Interchangeable insulators are used together with clamps of the roller type, permitting expansion of the bus.

Electric Vibrator

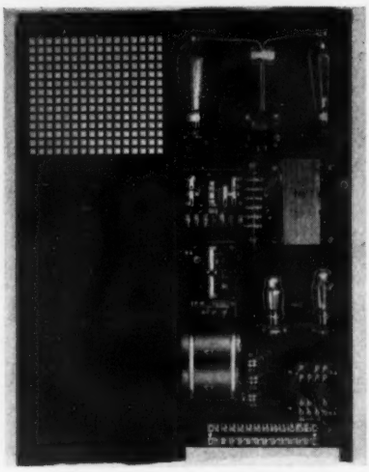
Vibration of wet concrete that can be reached from placing platforms or runways, as in floor slabs, shallow beams, bridge decks, etc., can now be done with an electric concrete vibrator. This device is powered with an electric motor which drives a vibrating shell 1¾ in. in diameter and 30 in. long. The principle of high speed (9,000 r.p.m.) and low vibration amplitude is used to insure maximum placing of concrete.

Rated ½ hp., 110 volts, a.c. or d.c.; weight, 36 lb. **Viber Company**, Los Angeles, Calif.

•

Electronic Voltage Regulator

Instead of relying on mechanical movements to close contacts or change pressure, an inertialess stream of electrons controls the regulating action of this new alternator voltage regulator. Basically the regulator consists



Designated as type EF; described in bulletin 5601-A. **Ward Leonard Electric Co.**, Mount Vernon, N. Y.

of a single-phase, full-wave rectifier deriving power from the a.c. generator and delivering rectified d.c. to the shunt field of the exciter in an amount which is a function of a.c. generator potential.

ENGINEERING DATA FROM MANUFACTURERS

Bulletins and catalogs now available to engineers by manufacturers and associations

MOTOR APPLICATION DATA—What is the price of a standard 7½-hp., 3,600-r.p.m., 60-cycle, squirrel-cage type induction motor for normal torque, normal current service? What is the distance between the motor mounting and the drive shaft of the above motor? What size wire should be used to connect this motor to the line? The answers to hundreds of such questions relating to the application of "Linc Weld" general-purpose motors are contained in the pages of a new bulletin of the Lincoln Electric Company, Cleveland, Ohio.

WELDING CHROMIUM STEELS — Recommended techniques for welding and cutting various types of high chromium steels are presented in an 8-page illustrated bulletin of the Line Air Products Company, New York City.

DIRECT-CURRENT MOTORS—Two leaflets known as bulletins Nos. 215 and 216 have been issued by the Reliance Electric & Engineering Company, Cleveland, Ohio, which describe construction features of this line of six-pole, heavy-duty, 40-deg. C. motors.

CONTROL SYSTEM—A new control system for regulating electrical input in proportion to demand requirements is described in catalog N-OO-A (8 pages), issued by Leeds & Northrup Company, Philadelphia.

ROTARY CONVERTER—Information on applications, features, dimensions, ratings and regulation of small rotary converters is in a 4-page leaflet of the Janette Manufacturing Company, Chicago.

MOTORIZED GEAR REDUCERS — Complete technical data on the Philadelphia line of "MotoReducers" are in the 28-page bulletin MR-36 of the Philadelphia Gear Works, Philadelphia, Pa. Several pages show pictures of typical applications.

SOLDERS AND BRAZING ALLOYS—As a service to its customers and all other users of silver solders and brazing alloys, Handy & Harman, 82 Fulton Street, New York City, has published a bulletin outlining the results of many years of research in this field. In its research laboratories fluxes, torches, furnaces and cleaning methods, besides strength and soundness of joint and the effect which various temperatures have on metal structures, have been tested and observed. Such theories as were developed were tested under all kinds of working conditions before being submitted to the public in this booklet.

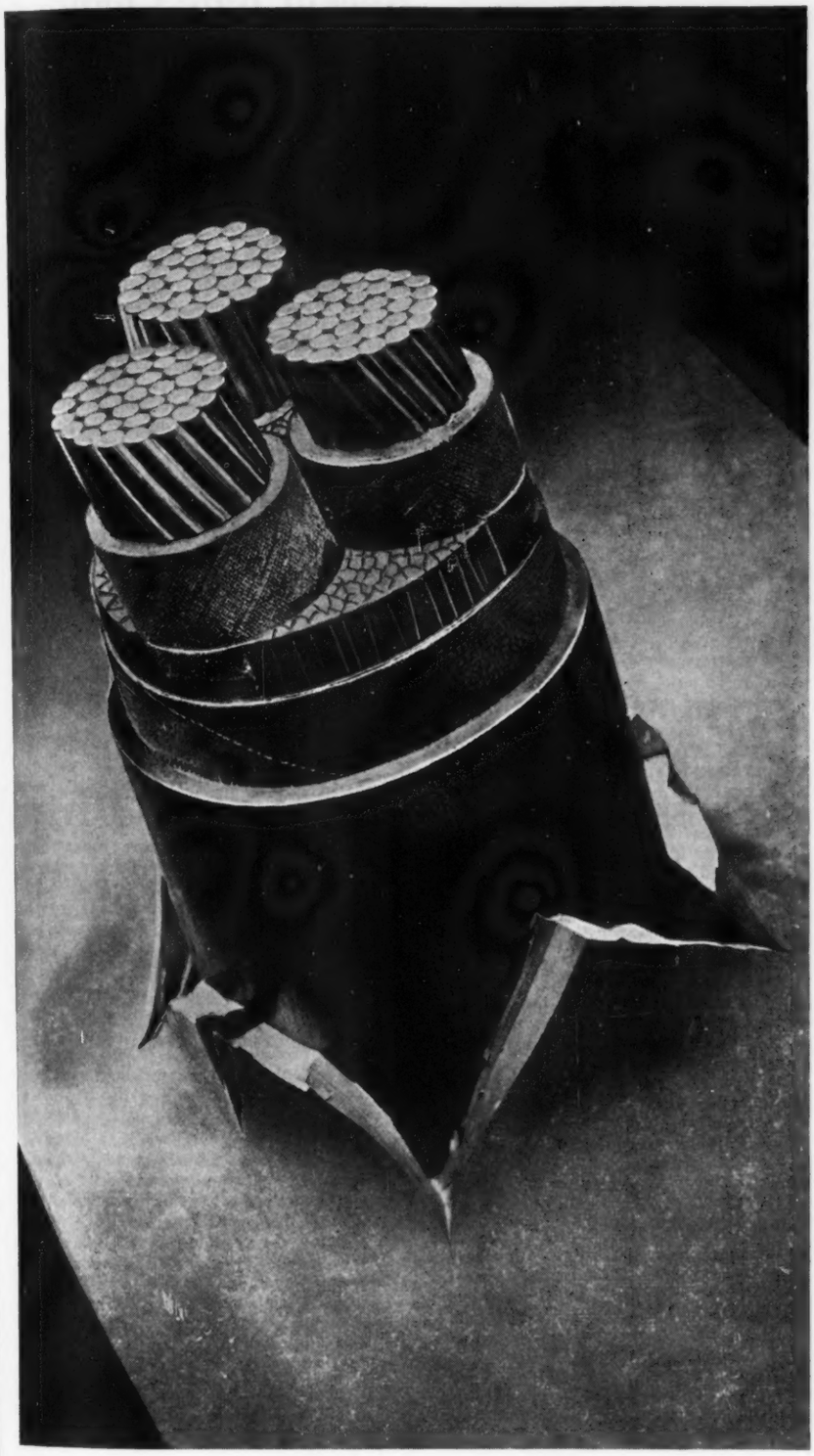
BRUSH SELECTION CHARTS—Problems of brush replacement selection are simplified by the use of a new chart now available from the Ohio Carbon Company, Lakewood, Ohio. The charts show the range of possible uses for each of the several brush sizes. Also offered is a Motor Record Book, in which a complete history of each motor (brush size, rewinding dates, etc.) can be maintained.

CABLE END BELLS—Design features of open bushing type cable end bells are given together with tabulated dimension and rating data in 35 pages of bulletin 502 of the Electrical Engineers Equipment Company, Melrose Park, Ill.

STEAM TURBINE BLADE DEPOSITS—Experiments looking to the determination of the cause and prevention of deposits on steam turbine blades are discussed in bulletin 282 of the Engineering Experiment Station, University of Illinois, Urbana.

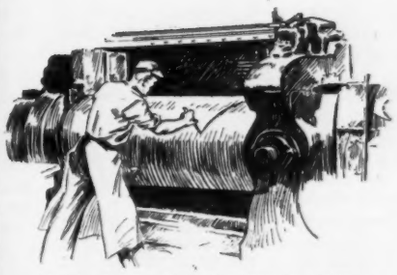
RADIAL WIRING—Complete information on the basic design of radial wiring systems is in a 32-page bulletin (No. 51-611) for engineers and architects published by the General Electric Company's merchandise department, Bridgeport, Conn. It also contains a convenient check list of different elements to be considered in residential wiring requirements.

FARMERS' WIRING GUIDE—A farmers' wiring guide has been prepared by *Electricity on the Farm* magazine, 24 West 40th Street, New York City. It is distributed at about cost. These comments have been made on it by various people: It is written for farmers in the language that farmers will understand. It details with only such points as the farmer himself must decide. It is easy to read; well illustrated; not too long. It promotes confidence in the power company. It "sells" the need and value of adequate wiring. It shows the right way to get adequate wiring.



ROEBLING

Rubber Insulated Cables



Sketch of our 84" Rubber Sheeting Mill, one of the many modern operations in the making of Roebling Rubber Insulated Cable.

Shown is only one of the Roebling Line of rubber Insulated Wires and Cables. They are made in a variety of insulated compounds to exactly meet a wide range of requirements such as, power transmission, railway signalling, building wiring and many other purposes.

Plain Rubber 60% Sheath Power Cable. "SAFECOTE" Rubber-insulated and Braided Wires and Cables: Code, Intermediate, 30% and 40% Performance, 35% and 40% Performite. 40% and 60% Sheath Flexible Cords. Parkway, Service, Mining, Welding, and Control Cables; Tree Wire.

These will give you a fair idea of the completeness of the Roebling Line. They are made in a wide range of sizes and voltages. Armors:—steel, zinc, or bronze tape, or round steel wire.

JOHN A. ROEBLING'S SONS CO.
Trenton, N. J. *Branches in Principal Cities*

OVER 60 OTHER TYPES

Power Cables; Paper; Cambric; Rubber » Parkway Cable » Tree Wire » Service Cables » Station Cables » Rubber Covered Control Cables » Rubber Covered Wires and Cables; Code; Intermediate; 30% and 40% Performance; 35% and 40% Performite; Plain Rubber 60% Sheath Power Cable and 40% or 60% Sheath Flexible Cords » Slow Burning Wires and Cables » Weatherproof Wires and Cables » Submarine Cables » Portable Cords » And a wide variety of other wires and cables.

ONLY A FINE PRODUCT MAY BEAR THE NAME ROEBLING

Municipal Plants

BARRON, WIS.—City has voted to purchase an additional unit to its present municipally owned plant in the form of a 1,080-hp. Fairbanks, Morse Diesel engine and erect a one-story brick building, 45 by 35 ft., to house the new engine. The complete cost of the new unit will be $76,860.

PERRY, IOWA—A proposal to erect a $325,000 municipal light and power plant here was defeated at a special election recently by 488 votes. The vote was 1,220 against and 732 for the plant.

AMES, IOWA—A narrow margin of two votes favored a 25-year gas franchise for the Iowa Electric Light & Power Company in a special election held here recently. The vote was 753 to 751. The company has been operating here for two years without a franchise. Its attempts to put the franchise to a vote sooner had been blocked by the city Councilmen who favored a municipal plant. The vote was heavy for a special election.

VILLISCA, IOWA—Iowa-Nebraska Light & Power Company and M. V. Goldsberry, Nellie Mann and Fred Greaves, taxpayers, were denied a temporary injunction against the city of Villisca by Judge Grover W. Brown, at a hearing in Red Oak on July 17. The suit was brought to restrain the city from building a municipal light and power plant under a contract let to the Fairbanks-Morse Company, of Omaha, and sublet to the McCorkle Construction Company, on a bid of $136,200. The plaintiffs contended interest and other expenses on the $136,200 was not reckoned in the total cost of the plant, which was voted at an election to be $150,000 payable from earnings under the Simmer law. The city is proceeding with the construction of the plant.

SPOKANE, WASH. — Voters of Lincoln County will pass upon the creation of a county-wide public utility district at the November election, as the result of the decision of state Supreme Court, which recently overruled the granting by a superior court of a restraining order to the Washington Water Power Company to prevent the county commissioners placing the proposal on the ballot. The Supreme Court said that all questions raised in the case were foreclosed by a previous decision holding the District Power Bill to be constitutional.

SANDUSKY, OHIO—A taxpayers' suit has been instituted by Solicitor William Didelius in Common Pleas Court to enjoin further City Commission action on building of a municipal power plant there. Judge E. H. Savord granted a temporary restraining order. The petition says the action was demanded by the Ohio Public Service Company, which charges that City Commission procedure has been irregular and illegal. The court is asked to permanently forbid a $1,400,000 bond issue which was authorized by a referendum vote in November, 1933.

BRIDGEPORT, OHIO—Several hundred citizens have petitioned City Council proposing an ordinance authorizing an $85,000 bond issue for a municipal light plant. The petition, previously blocked by a 3-3 deadlock in Council, if successful, provides for a vote on the issue at the November election.

MEMPHIS, TENN.—Officials of the city of Memphis will open bids within the near future on a proposed municipal distribution system to hook up with T.V.A. power. Ray Husselman, consulting engineer, said he is working on the general design for the system and that it would be completed shortly. Contract specifications will be completed next month. C. L. McLelland and H. A. Dunian of Houston, Tex., were added to his staff last week as detail designers.

WASHINGTON, KAN.—The proposed municipal light and power plant and distribution system for which this city recently authorized the issuance of $88,000 in bonds is still indefinitely delayed due to litigation instituted by the private utility which is now furnishing this community with electricity. The proposed improvements would include a Diesel-engine generating unit and the necessary distribution lines. E. T. Archer & Company, 609 New England Building, Kansas City, Mo., are the consulting engineers.

RUSSELL, KAN.—City officials are contemplating the use of local labor on a force account basis for the construction of the municipal light and power plant, for which $112,000 bond issue was voted on April 21 last. The bonds were sold on June 16. No date has been fixed for taking construction bids on the project.

BELLEVILLE, ILL.—Mayor George Remnsnider has definitely announced that Belleville has abandoned consideration of a municipal light and power plant. Some months ago it was suggested that the city construct such a plant at a cost of about $750,000. Likewise the city has abandoned for the time being at least consideration of a municipal water works system. Such a plant would cost upward of $1,500,000, it had been estimated.

JACKSONVILLE, ILL.—The proposed $420,000 municipal light and power plant for this city has been postponed indefinitely, due to the litigation in opposition to the project instituted on behalf of the Illinois Power & Light Corporation.

ROCKWELL CITY, IOWA—Voters of this city at a recent election approved the issuance of $175,000 of revenue bonds to finance the construction of a municipal light plant and distribution system. Plans for the plant are in charge of Young & Stanley, consulting engineers, of Muscatine, Iowa. It is thought that bids for constructing the plant will be taken at an early date.

IOWA CITY, IOWA—Bids for the construction of the municipal light plant probably will not be taken until next fall, when the present litigation involving the project will come up before the Supreme Court. Plans prepared by Burns & McDonnell Engineering Company of Kansas City, Mo., call for a $917,000 outlay to include two 3,000-kw. steam generators, two 3,000-sq.ft. condensers, two 35,000-lb.-per-hour steam-generating units, one 75-kw. house generator, a switchboard, pumps and heat-balance equipment. The project is to be financed through a P.W.A. grant of $413,000, with the balance of the funds raised locally.

NEW MARKET, IOWA—A contract has been awarded to Fairbanks, Morse & Company, Omaha, Neb., at $53,282.47 for the construction of a municipal power plant and distribution system. The improvements will include a brick power plant building, 31x41 ft., concrete foundation, Diesel generating unit, switchboard, auxiliary station wiring, and appurtenances.

AYR, NEB.—Sale of the municipal plant of this village to the Southern Nebraska Power Company was declared void by the Nebraska Supreme Court under an initiative law which restricts private persons, firms, associations or corporations proposing to acquire by lease or purchase the distribution system of any municipality.

TRENTON, MO.—This city received bids up to July 29 on the construction of a municipal light and power plant building and equipment and distribution system. The estimated cost of $315,000. Burns & McDonnell Engineering Company, Kansas City, Mo., are the engineers in charge of plans and specifications. The project is being financed with PWA funds.

Recent Rate Changes

INDIANOLA, IOWA, municipal plant has been ordered by the City Council to give customers a discount of 10 per cent on all bills paid before the middle of the month. This plan was adopted instead of lowering the rates and becomes effective in August.

LONG ISLAND LIGHTING COMPANY has been ordered to make further reductions in electric rates which will save consumers $77,500 annually in addition to reductions directed last December which were estimated to save electric users $1,066,500. The decreases now ordered bring the total savings to electric consumers on Long Island to $1,194,000 a year, including a $50,000 annual decrease in wholesale power rates made by the company. The greater part of the recent reductions will be made effective in the eastern division of the company's territory, largely in Suffolk County. The domestic rate now ordered is a minimum charge of $1 for the first 12 kw.-hr. per month, 6.5 cents per kilowatt-hour for the next 30 kw.-hr., 5 cents per kilowatt-hour for the next 58 kw.-hr., 3.5 cents per kilowatt-hour for the next 100 kw.-hr. and 2 cents per kilowatt-hour for all use in excess of 200 kw.-hr. per month.

NORTH CAROLINA electric customers have been the beneficiaries of $5,000,000 in rate cuts over a period of the last five years. In 1932 alone the cuts amounted to over a million and a quarter dollars. In 1936 the cuts have reached almost $1,103,250. Of this amount Carolina Power & Light Company contributed $600,000.

NEW LISBON, WIS., municipal plant rate reductions of $3,600 per year have been announced by the Wisconsin Public Service Commission. Under the new home rate schedule consumers will pay a fixed charge of 60 cents per month, 6 cents a kilowatt-hour for the first 50 kw.-hr., 3 cents for the next 150 and 2.5 cents for the balance.

WISCONSIN-MICHIGAN POWER COMPANY has been granted permission to make a reduction which will annually amount to $5,400 in electric rates for 2,415 store and office customers in the southern division of Wisconsin. The new rate provides for a 79-cent service charge, 6 cents per kilowatt-hour for the first 250 kw.-hr., 4.5 cents for the next 750, 3.5 cents for the next 1,000 and 2.5 cents for all over 2,000 kw.-hr.

CANADA ELECTRIC COMPANY had its estimated operating expenses reduced by the Nova Scotia Board of Public Utilities by more than 5 per cent, resulting in a reduction of more than $18,411 in power charges to domestic and commercial consumers in Amherst and vicinity.

DYERSBURG WATER & LIGHT PLANT of Dyersburg, Tenn., has announced rate reductions of about 13 per cent effective for August.

KENTUCKY UTILITIES COMPANY must submit to a hearing relative to rate reductions in Paducah under an order granted Mayor E. T. Washburn.

CITY LIGHT & TRACTION COMPANY of Sedalia, Mo., under an agreement with the City Council will reduce its rates to domestic and commercial customers to effect an annual saving to consumers of approximately $26,700.

WEST COAST POWER COMPANY, serving South Bend, Raymond and rural areas in Washington, has announced rate reductions totaling some $2,000 a year, effective on billings of July 1, both on residential and commercial rates.

KANSAS UTILITIES COMPANY has announced reductions in rates in fifteen southeastern Kansas towns to save customers approximately $11,000 annually.

Best in Baseball Lighting at Low Cost

[*Continued from page 25*]

arrangement of the structure is such that the cost of installing and connecting the units is a minimum; no conduit wiring is required on the entire job. The towers have platforms for mounting the transformers to serve the individual banks of floodlights, which eliminates the use of heavy secondaries between structures and insures full voltage at the lamps. They provide a self-sustaining support for the primary circuits which are overhead. There is no need to guy any structure against the unbalanced pull of the primary conductors. Absence of guys and anchors in or adjacent to the playing field eliminates a serious hazard of accidental injury to the players. By supporting the primary circuit on the short pole the danger of accidental contact with the primary when climbing the structure to change lamps is eliminated.

Quality and safety with economy

The entire design of the installation tends toward the utmost in economy without sacrificing quality or safety. Elimination of secondaries between towers is a big saving and at the same time reduces the chances of a fly ball being deflected by striking the wires.

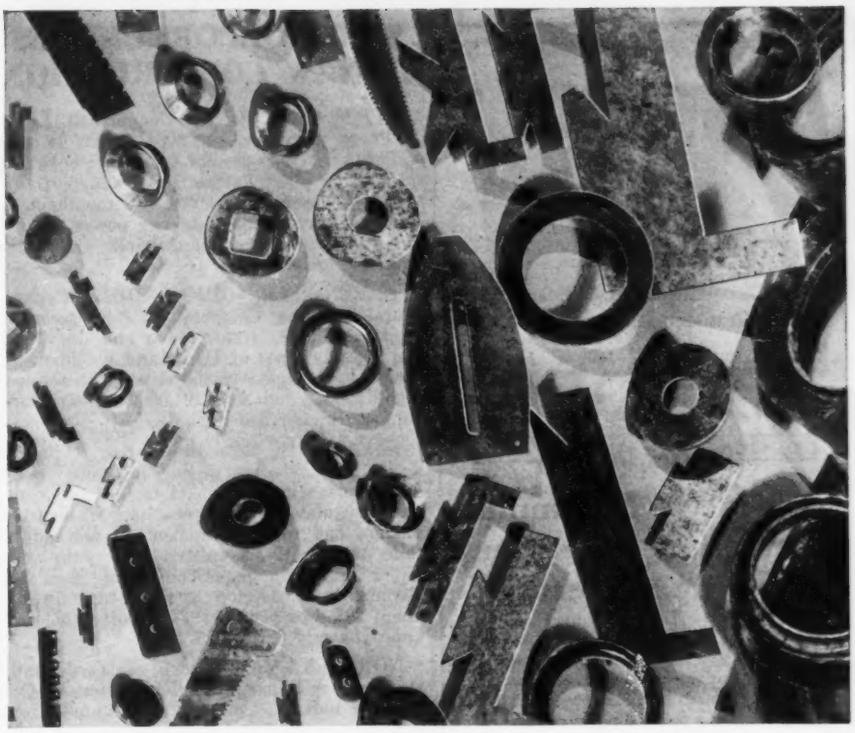
Transformers used are the type with a built-in circuit breaker on the secondary side. A mechanical remote control operates the breaker from the ground, permitting banks of lamps to be cut off at will. Outfield lights can be cut off while the infielders are warming up before the game, thus permitting a saving in operating cost. Secondary circuits are all open wiring. A ground wire is run down each pole and across each arm. These wires are bare and are stapled to the poles and arms. The transformer secondary neutral is connected to the ground wires. The 240-volt leads from the transformer are brought up to the center of the arms on racks. Single-wire laterals are run from these to the lighting units on porcelain knobs. One side of each lighting unit is connected solidly to the ground wire, the other side is connected to the 220-volt lateral through a weatherproof socket fused with a 20-amp. plug fuse.

This simple arrangement is inexpensive and saves the cost of an expensive panelboard. It also saves the cost of multiple circuits from the panelboard to each lighting unit.

•

Survey for Rural Power

Engineers for the Mississippi Power Company are conducting a survey of Copiah County, Miss., to determine extension of power for rural electrification.



MICABOND

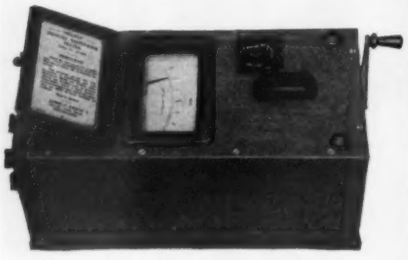
The Only Insulation for Some--the Best Insulation for Many Purposes

MOLDING PLATE
SEGMENT PLATE
HEATER PLATE
FLEXIBLE SHEETS
TAPE-TUBING
FABRICATED PARTS SUCH AS "V" RINGS SEGMENTS AND WASHERS

Micabond combines the good qualities of raw mica with adaptability. It is mica in its most usable form—insulation that should be specified wherever maximum dielectric strength is needed in equipment subject to high operating temperatures.

Let us help you select Micabond in correct grade, form and strength for your requirements. Perhaps it might be economical to have us supply your fabricated parts, ready for assembly, a service some Micabond users find most advantageous. Ask for details.

CONTINENTAL-DIAMOND FIBRE COMPANY
NEWARK, DELAWARE



"MEGGER" Ground Tester

"MEGGER"
GROUND TESTER

"Gives Us Maximum Protection from Our Lightning Arresters"

"We feel that ground testing is absolutely necessary to give us the maximum protection from our lightning arresters and that the ('Megger') Ground Tester enables us to keep these grounds at a point of most service to us."

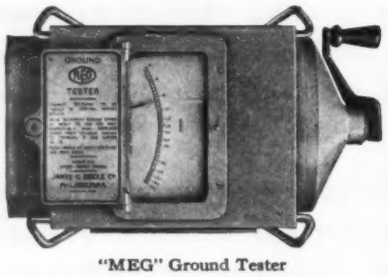
A Lighting Company in New York State.

"We have found that the 'Meg' Ground Tester far surpasses our expectations. In fact we can hardly believe how such accurate results are obtained. . . "

A Power Company in Pennsylvania.

Now is the time of year to take action on ground testing. "Megger" and "Meg" Ground Testers are THE instruments for the purpose.

Write for Descriptive Bulletin 1425-W.



"MEG" Ground Tester

JAMES G. BIDDLE CO.
ELECTRICAL INSTRUMENTS
1211-13 ARCH STREET PHILADELPHIA, PA.

Other Biddle Specialties:

"Megger" Insulation Testing Instruments
"Megger" Capacitance Meter
"Ducter" Low Resistance Testing Sets
"Dionic" Water Tester
"Frahm" Vibrating-Reed Tachometers
"Frahm" Vibrating-Reed Frequency Meters
"Jagabi" Rheostats
"Jagabi" Speed-Measuring Instruments

SALES OPPORTUNITIES IN NEW CONSTRUCTION

SCOTLAND, CONN.—Connecticut Light & Power Company, Hartford, Conn., is considering early rebuilding of hydroelectric generating plant at Scotland Dam, partially destroyed by flood waters a few months ago, used primarily for emergency power supply for Eastern Connecticut district. Cost estimated over $200,000.

GREENVILLE, OHIO — Darke County Rural Lighting Co-operative, Inc., recently organized, plans transmission and distributing lines in parts of Darke and neighboring counties, totaling over 250 miles, with service facilities. Fund of $294,000 is being arranged through Federal aid.

SAVANNAH, GA.—Union Bag & Paper Corporation, Woolworth Building, New York, N. Y., plans installation of motors and controls, regulators, conveyors, electric hoists, loaders and other equipment in new additions to recently completed draft pulp and paper mill, and paper-converting plant at Savannah, to develop a total capacity of about 225 tons per day. New units will cost approximately $2,500,000.

NORFOLK, VA.—Bureau of Yards and Docks, Navy Department, Washington, D. C., receives bids (no closing date stated) for two surface condensers, air-ejector and two electric-operated condensate pumps for 6,000-kw. turbo-alternator at Navy Yard, Norfolk (Specifications 8239).

COLUMBIA, MO.—Plans call for bids in near future for extensions and improvements in city-owned electric power plant, including new 5,000-kw. steam turbo-generator unit with accessories, high-pressure boiler, 7,000 sq.ft. surface condenser and complete accessories. Entire project will cost about $280,000. Burns & McDonnell Engineering Company, 107 West Linwood Boulevard, Kansas City, Mo., is consulting engineer.

BRISTOL, CONN. — Holo-Krome Screw Corporation, Bristol, plans installation of motors and controls, conveyors, hoists and other equipment in new one- and two-story screw-manufacturing plant. Cost close to $100,000. Company is a subsidiary of Veeder-Root, Inc., Hartford, Conn.

ANAMOSA, IOWA — Iowa Electric Company, Cedar Rapids, Iowa, plans extensions and improvements in hydroelectric generating plant at Anamosa dam, Wapsipinicon River, including installation of new turbo-generating unit and accessory equipment. New power house addition will be built. Proposed to extend transmission lines in this district.

MEMPHIS, TENN.—Plans call for bids in September for city-owned electrical distributing system, with transmission lines for connection with high-tension system of T.V.A. which will furnish power, including power substations, switching stations and auxiliary operating facilities. Entire project will cost about $6,870,000, of which $3,092,000 is being secured through Federal grant. Roy Husselman, Hippodrome Building. Cleveland, Ohio, is consulting engineer.

BATTLE CREEK, MICH. — Postum Company, a division of General Foods Corporation, New York, N. Y., plans installation of motors and controls, regulators, conveyors and other equipment in two new multi-story plant additions. Cost over $1,000,000.

BROOKLYN, N. Y. — Signal Corps Procurement District, United States Army, Army Base, Fifty-eighth Street and First Avenue, receives bids until August 14 for quantity of electrical supplies, including control units, insulators, socket caps, etc. (Circular 10).

BAY MINETTE, ALA.—Alabama Power Company, Birmingham, Ala., plans transmission lines from Silverhill, Ala., to Bay Minette, including distributing lines at different points along route for rural electrification. Total development will include over 100 miles of new lines in that area. Connection will be made with system of Riveria Utilities Corporation, vicinity of Bay Minette.

MEMPHIS, TENN. — Armour & Company, Chicago, Ill., plans installation of motors and controls, conveyors, loaders and other equipment in connection with expansion and improvements in meat-packing plant at Memphis. Entire project will cost close to $100,000. Henry J. Kramer, 1756 Vinton Avenue, Memphis, is associate architect.

CLEVELAND, OHIO—Cleveland Electric Illuminating Company has filed plans for addition to power substation on East 146th Street, including improvements in present station. Cost over $125,000, including equipment.

BRAINERD, MINN.—Crow Wing County Rural Power Company, Inc., recently organized, plans transmission and distributing lines for rural electrification in parts of Crow Wing and neighboring counties, totaling about 400 miles, with power substation and service facilities. Fund of $660,000 is being secured through Federal aid.

CONNEAUT, OHIO—Has authorized surveys and estimates of cost for city-owned electric power plant. Paul W. Elwell, 5005 Euclid Avenue, Cleveland, Ohio, is consulting engineer.

OCEAN BEACH, N. Y.—Long Island Lighting Company, 50 Church Street, New York, N. Y., plans extension in transmission line for light and power service at Ocean Beach, where franchise has been secured. Permission has been granted.

DETROIT, MICH.—Detroit Forging Company, 3564 Toledo Street, plans installation of motors and controls, conveyors, electric hoists and other equipment in new plant unit, designed to triple present capacity. Cost over $200,000.

WASHINGTON, D. C.—Bureau of Supplies and Accounts, Navy Department, Washington, receives bids until August 4 for motor-generator sets, control appliances and spare parts for Portsmouth, Va., and Mare Island, Calif., Navy Yards (Schedule 8447). Also, until August 11, for quantity of electric cable for same yards (Schedule 8455).

TUPELO, MISS.—Tennessee Valley Authority, Knoxville, Tenn., has authorized surveys for steel tower transmission line, 110,000-volt, from connection with present system to Tupelo and vicinity, for power supply in that district.

COLUMBUS, OHIO—Bureau of Water, C. B. Hoover, waterworks superintendent, plans extensions and improvements in power plant and waterworks station, including installation of two 500-hp. boiler units with accessories, two generating sets and auxiliary equipment, electric-operating pumping machinery with capacity of 80,000,000 gallons per day and complete accessory equipment. Cost about $1,000,000. Bond issue will be voted at general election in November.

CORNING, IOWA—Adams County Co-operative Electric Company, Inc., Corning, recently organized, will take bids soon for transmission and distributing lines in Adams County for rural electrification, totaling about 110 miles, with service facilities. Power substation will be built at city limits, with transmission line to local municipal power station, which will furnish service. Fund of $120,000 has been secured through Federal aid.

PROFESSIONAL SERVICES

Consulting Accounting Valuations — Management Appraisals Construction — Designing Testing Financing — Inspections Cost Analysis Investigations

WILLIAM A. BAEHR ORGANIZATION, Inc.
ENGINEERS—ACCOUNTANTS—MANAGERS
231 South La Salle St.
CHICAGO

ELECTRICAL TESTING LABORATORIES
Electrical and Mechanical Laboratories
Tests of Electrical Machinery Apparatus and Supplies. Materials of Constructions, Coal, Paper, etc. Inspection of Material and Apparatus at Manufactories.
80th St. and East End Ave., New York

SANDERSON & PORTER
ENGINEERS
for the
FINANCING—REORGANIZATION—DESIGN—CONSTRUCTION—
of
INDUSTRIAL and PUBLIC UTILITIES
Chicago New York San Francisco

BARKER & WHEELER
Utility and Industrial Valuations. Design and Construction of Power Systems, Water Supplies, Sewerage and Sewage Disposal, Factory Production and Cost Control Systems.
11 Park Place, New York City
36 State Street, Albany, N. Y.

FORD, BACON & DAVIS, Inc.
Engineers
DESIGN . CONSTRUCTION
VALUATIONS . REPORTS . INTANGIBLES
Philadelphia New York Chicago
Washington Dallas

SARGENT & LUNDY
Incorporated
ENGINEERS
140 South Dearborn St.
Chicago, Ill.

BLACK & VEATCH
Consulting Engineers
Water, Steam and Electric Power Investigations, Design, Supervision of Construction, Valuation, Tests and Laboratory Service.
Mutual Building, Kansas City, Mo.

FRANK F. FOWLE & CO.
Electrical and Mechanical
ENGINEERS
35 East Wacker Drive Chicago, Ill.

SPOONER & MERRILL, INC.
Consulting Engineers
Design—Supervision of Construction
Reports—Examinations—Valuations
20 North Wacker Drive, Chicago, Illinois

EDWARD J. CHENEY
ENGINEER
PUBLIC UTILITY PROBLEMS
61 Broadway New York

HOOSIER ENGINEERING COMPANY
Erecting Engineers
Transmission Lines, Substations
46 So. 5th St., Columbus, Ohio
431 So. Dearborn St., Chicago, Ill.
136 Liberty St., New York

STEVENS & WOOD
Incorporated
INVESTIGATIONS—REPORTS
APPRAISALS
30 Broad St. New York

HUGH L. COLEMAN
Specializing in Aerial Transmission Cable
Power Construction
Great Barrington, Mass.

CHARLES F. LACOMBE
WILLIAM S. LEFFLER
Engineers
Public Utility Administrative
Economic and Municipal Problems
Cost Analysis
Inducement Rate Development
Rate Cases—Appraisals
11 West 42nd Street, New York

JAMES WALKER
Consulting Engineer
Appraisals Railroads
Reports Public Utilities
Investigations Industries
105 West Adams St. Chicago

HUGH L. COOPER & CO.
General Hydraulic Engineering, including the design, financing, construction and management of hydro-electric power plants.
101 Park Ave. New York

LUCAS & LUICK
ENGINEERS
Power Plants Transmission Lines
Industrial Plants
Examinations Reports Valuations
Rate Cases
Public Utility Management
231 So. La Salle St., Chicago

THE J. G. WHITE ENGINEERING CORPORATION
Engineers—Constructors
Steam and Hydroelectric Power Plants, Transmission Systems, Office and Industrial Building, Air Conditioning, Railroads.
REPORTS and APPRAISALS
80 Broad Street New York

CARDS ON THIS PAGE
of Professional Services
are available at a cost that is negligible considering the possible clientele contacted. Rates on request to
Departmental Advertising Staff
ELECTRICAL WORLD, 330 W. 42d St., N.Y.

DANIEL W. MEAD
F. W. SCHEIDENHELM
Consulting Engineers
Hydro-Electric Development, Dams, Water Supply, Flood Control. Engineering Problems relating to Water Rights and Water Power Law. Appraisals.
New York City, 50 Church St.

Consulting Engineers can give needed advice regarding most any problem for they see each separate department in its relation to the whole plant—and they sell nothing but their broad experienced services.

for that speech . . .

get the material you need, from Hoffman's
THE PUBLIC SPEAKER'S SCRAPBOOK
Presents hundreds of selected beginnings, endings, provocative paragraphs, illustrations, anecdotes, etc., to build up your speech for any occasion. Also helpful hints on speaking. Send $2.50 for a copy on 10 days' approval.
McGraw-Hill Book Co., Inc., 330 W. 42nd St., New York City

CRESCENT WIRE

ONE SOURCE
. . . for . . .
EVERY WIRE and CABLE NEED . . .

WE invite you to make use of our facilities for delivering out of stock standard insulated wires and cables from our Trenton factory, or from warehouse stocks carried in principal cities, and for manufacturing to your order almost any type of insulated wire, cable or cord that you may require. The completeness of the Crescent line assures you of one reliable source of supply for practically all your wire and cable needs. The cooperation of our Engineering staff is freely offered on all special wiring problems.

SIGNAL CABLE	RUBBER POWER CABLE
CONTROL CABLE	LEAD COVERED CABLE
PARKWAY CABLE	VARNISHED CAMBRIC CABLE
MAGNET WIRE	WEATHERPROOF WIRE

ALL TYPES OF BUILDING WIRE

and all kinds of special cables to meet A.S.T.M., A.R.A., I.P.C.E.A., and all Railroad, Government, and Utility Companies' specifications.

CRESCENT INSULATED WIRE & CABLE CO. INC.
TRENTON, NEW JERSEY.

Bonneville Power Cost Study

[*Continued from page 35*]

transmission cost were set forth in the report as follows:

Plan I—Each substation is assumed to carry its proportionate share of the capital cost of the transmission system. Allocation of charges to be based upon the peak demands and their relative distance from the point of generation. It was further assumed that independent contracts would be made for firm power at each main substation based on the cost of power at those substations.

Plan II—Following a method adopted by T.V.A., the capital and annual costs of the transmission system within the entire territory served have been lumped into a single unit. Effect of this plan is to subsidize the outlying and low-demand districts at the expense of the nearer and larger power-consuming portions.

An accompanying chart compares graphically the effect upon the total cost of power, at the receiving station, produced by these two plans. From this chart it becomes readily apparent that under Plan II delivered energy costs at the substations of the large load centers nearest the point of generation are materially greater than for Plan I. At Portland, for example, delivered costs are 1.5 mills per kilowatt-hour, or $5.25 per kilowatt-year greater under Plan II than under Plan I.

Distance that Bonneville power can be delivered economically depends upon whether its delivered cost at substations can compete effectively with power generated locally or with power obtained from other sources. If Bonneville energy partially displaces energy now generated by existing plants the owners of these facilities, according to the report, "must continue paying operating expenses on their properties whether they are returning a gross revenue sufficient to pay fixed charges or not. Therefore these plants could better afford to reduce their rates, even to the point of obtaining only sufficient income to pay operation and maintenance charges, than to lose their existing load. When load on the tributary area increases to the point where new generating facilities are required, power from Bonneville will have to be delivered cheaper than it can be generated locally." Approximate figures for generation costs were presented as follows to indicate the probable future average competitive power costs in the transmission area tributary to Bonneville. All costs include fixed charges:

Steam	4.5 to 7.0 mills
Diesel	7.0 to 12.0 mills
Hydro	2.0 to 5.0 mills